# ORDNANCE AND THE WORLD WAR

MAJOR GENERAL
WILLIAM CROZIER

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## A Contribution to the History of American Preparedness

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BY

MAJOR-GENERAL
WILLIAM CROZIER

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THIS BOOK IS DEDICATED TO

THE ORDNANCE OFFICERS

WHOSE DEVOTED SERVICES MADE THE RECORD
WHICH IS HEREIN ONLY PARTIALLY
SET FORTH

# INTRODUCTORY

THIS BOOK is written in the belief that there is a public in the United States which would wish to know something of the method by which its great army was prepared to play its part in the World War. Everybody now knows that we entered the war with a very small army and a wholly inadequate supply of arms, ammunition and other equipment; but there are some who do not know why it took so long a time to raise the war army and transport it to Europe, or why its supply with certain American-made munitions was so much delayed; and there are even some who, puzzled by suggestions from sources claiming to be well informed, do not know why we were not better prepared originally, at least in the matter of war equipment. Official reports have made known that we did not send to Europe artillery of the two most important calibers in time to have any of it get into use at the front before hostilities ceased. And the same fact has developed concerning gas shell. The funds which were made available for supplying equipment were prodigious in amount, and the citizen who is in the habit of thinking that America is a master of manufacture is naturally receptive of the criticism that such delay must necessarily imply incompetence of personnel or clumsiness of method, or both.

I shall try herein to show where the principal trouble lay with regard to the fighting equipment

which is furnished by the Ordnance Department, and in doing so I shall tell something of the organization of that department, in order that an idea may be formed as to its fitness for its task, and as to the necessity for a substitute organization, which was suggested, with strong backing, for taking over that portion of the Ordnance Department's work which had to do with the procurement of munitions by contract with private manufacturers. I shall then illustrate the course of the Department's performance by giving some prominent instances in which intense dissatisfaction was expressed popularly, and also in certain high official quarters, with the progress which was made in the supply of important equipment during the early months of the war, and shall try to make it appear whether the Ordnance Department met its responsibilities well, or better action could have been taken under the circumstances. I shall do this in the hope that the interested reader may thereby be enabled to form a judgment as to where his efforts should be directed in order that we may not again enter a war under conditions requiring so much time for their correction, and so much protection by other forces while we are making our own ready to enforce the nation's will.

I should add that, having retired from active service, I am no longer a part of the War Department or of the Army with the Colors. I therefore speak without official authority, and with something of the freedom of any other citizen.

April 13, 1920.

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# Ordnance and the World War

## I

### THE ORDNANCE DEPARTMENT

The Ordnance Department has the duty of designing, procuring by manufacture or purchase, supplying to the service and maintaining in repair the artillery, small arms, ammunition, pyrotechnics, grenades and trench warfare weapons for the fixed defenses and mobile armies of the United States and its insular possessions, and supplies also the small arms for the Navy and the Marine Corps. Until the latter part of the World War it supplied the personal equipment of the men, that is, their pack carriers, cartridge belts, mess kits, etc., the horse equipments for the cavalry, and the harness for the artillery; but these last were taken over by the newly created division of Purchase, Storage and Traffic, leaving to the Ordnance Department the technical supplies generally comprised in the terms arms and ammunition.

Military nations have adopted different methods for providing an organization to attend to the above mentioned duties. The common practice has been to confide the task to a body of officers selected from

the artillery service, and in European industrial countries great reliance has been placed upon private manufacturing establishments for the designs and the experimental work preliminary to the introduction of new types of weapons. The Krupp establishment in Germany, the Skoda in Austria, the Ansaldo in Italy, the Creusot in France and the Vickers in England are well known examples of private manufactories which have contributed notably to the munition making of the world. Such establishments, with their expensive staffs and special facilities, must, of course, be sustained on a money-making basis. This has been possible both by reason of the encouragement of the respective governments, and also because of the markets afforded for the military output of the factories by the backward industrial countries of the Orient and of the new world, in the supply of which markets the home governments have often given very material assistance to the home factories. At each of these establishments a corps of engineering designers has been maintained, largely recruited from the military services.

The United States has never had such establishments to rely upon, and therefore, from the beginning of its existence, has followed the method of providing a special governmental organization for attending to the design and the supply of arms and ammunition, the fighting munitions of war. In the Continental Congress a special committee known as the "Board of War and Ordnance" was charged with the duty of supplying the revolutionary forces

with war material, in so far as this was done by the central government. The committee was composed of five members of the Congress, but was soon enlarged by the addition of persons not members of Congress, and was shortly again changed so as to exclude the members of Congress and reduce the board to three members. This was in primitive form the beginning of the War Department, which was thereafter evolved as the special branch of the government for the control of the military forces. The name was changed to the "Board of War," but its functions continued to include the supply of the forces with ordnance material. The board had under it a body of officers known as Commissaries General of Military Stores, for the care of the munitions procured by the Board of War and their issue to the service.

In 1781 the office of Secretary of War was created, and in 1794 there was created the office of Superintendent of Military Stores, who was given charge of the custody of these stores, but not of their procurement. As yet there was no Ordnance Department, and the duties which were afterwards assigned to the Chief of Ordnance were distributed between the President, the Secretary of War and the Commissary of Military Stores and his assistants. In 1812 the Ordnance Department was created and placed under an officer with the rank of colonel, and the title of Commissary-General of Ordnance. This officer was given assistants with titles like his own and appropriate military rank, and the whole department was placed under the Secretary

of War. In 1815 the title of Commissary was discarded and the officers were designated as colonels, lieut.-colonels, etc. In these early years the actual work of manufacturing arms and ammunition was performed by artisans who were first employed and later enlisted in the Ordnance Department. Again, in still later years and up to the present time, these enlisted men formed the guards and caretakers of the ordnance establishments and the field force for issue and repair of ordnance stores, and the work of manufacture at these establishments was performed by employees.

During the early years of its existence the officers of the Ordnance Department were appointed from the rest of the Army or from civil life. For eleven years, from 1821 to 1832, they were obtained by detail from the Artillery, with which the department was merged. But this arrangement not proving satisfactory, the department was re-established by the Act of April 5, 1832. After its creation the Military Academy at West Point became a source of supply of ordnance officers, as of other officers of the Army; and for a number of years the practice was to appoint to the Engineer Corps the highest graduates of each class, and to the Ordnance Department the next following. From the early days of the existence of the department solicitude was displayed by Congress as to the qualifications of ordnance officers. When it was to be enlarged examinations were prescribed as a condition precedent to the transfer of officers from other branches of the Army, and in 1863 an examination was instituted by law as a condition of

promotion, some twenty-seven years before this requirement was prescribed for officers of the Army at large. In 1869, following a reduction in the strength of the Army, appointments and promotions in the Ordnance Department were suspended for several years; and during this period of suspension much consideration was given to the best method of securing officers for taking charge of the design and procurement of the nation's munitions, for which there was no other body of citizens who could be called upon.

The designing and constructing ordnance officer must be a mechanical engineer, since no characteristic of this mechanical age is more pronounced than the complete entry of its spirit into the production of implements and engines of war. The ordnance officer's knowledge of engineering subjects must not be merely that of the liberally educated man, understanding the general principles of all professions, but that of the expert with details at his finger ends, and he must have a specially sound mastery of principles, since he must oftentimes deduce the methods of their application to his art without the aid of the many handbooks and practical treatises which are available in the civil practice of the engineering profession. Progressive development of arms and armament requires strenuous prying, with stimulated imagination, in advance of the known; for war is competition, and there is no standard of excellence for anything. It does not suffice to have good soldiers, good officers, and good armament, if the enemy has better soldiers, better

officers, and better armament. The intense application and close work required of an ordnance officer are not attractive to one without special aptitude, and do not of themselves tempt line officers to laborious preparation for entry into the Ordnance Department from a life which certainly offers a more agreeable combination of indoor and outdoor occupation than does that of the technical staff officer. The necessity for some incentive for service in the Ordnance Department was therefore recognized.

In 1873 the Corps was reopened with a new scheme for the recruitment of officer personnel. The lowest grade in the corps was made that of 1st lieutenant, and transfer to the corps was to be preceded by an examination satisfactory to a board of ordnance officers. The examination was not required by law to be competitive, but the practice of the department soon made it so that the stimulus of an advance in grade for the successful 2nd lieutenant of the line, and of permanent transfer to a corps of which he liked the duties and in which subsequent promotion was faster than in the line, being sufficient to secure a number of competitors for each vacancy. This system was quite successful, and furnished excellent officers for the Ordnance Department. It lacked the advantage of an easy way to disembarrass the department of officers who did not fulfill their early promise and it thus failed to keep up the stimulus of competition after entry into the department, but it was probably better than was enjoyed by any other branch of the service, and it

lasted until the reorganization of the Army after the Spanish War.

In the temporary interest in the Service which always follows war there was the usual scrutiny of the military machine after the Spanish War, and among the criticisms of organization and methods probably the most severe were directed against the staff departments as being too completely divorced from the line, and consequently lacking both in knowledge of line requirements and in sympathetic concern in meeting them. There was no doubt of the harsh things said of the staff by line officers, and whether these charges were justified or not, it was part of good organization to try to remove their cause, and produce harmony between the mutually essential components of the military force. The cause was diagnosed as the completeness of the separation of the staff officer when he was permanently transferred from the line; and the cure, as applied in the Act of February 2, 1901, was to place all the staff departments, except the Judge Advocate General's, the Medical Department and the Engineers, under a detail system, in which their officers were detached from the line for tours of four years, with compulsory interval of two years between successive details in grades below that of lieut.-colonel. The new system was not made to apply to officers already in the staff departments, who continued on therein, but with no more permanent transfers, and it prevailed up to the time of our entry into the European War, without important modification except as to the Ordnance Department.

The detail to the staff was accompanied by no increase of rank, being made from the same grade in the line as that in the staff department which was filled by the detail; and as promotion took place in the line only, there was no special incentive to seek service in a staff department, except a liking for the work of the department. This incentive was not sufficient to secure officers for the Ordnance Department, which had kept up its standard of qualifications by continuing the examination as a condition precedent to detail, as it had before been a condition precedent to permanent transfer. The diminution of incentive was such that not only was it impossible to secure competition for detail to the department, but there were not enough applicants for detail to fill the vacancies, and oftentimes there were no applicants at all. Officers would not undertake the labor of preparation for examination, and incur the risk of failure, for the sake of entering upon the laborious duties which would follow success. In 1906, therefore, after five years of strong effort on the part of the Chief of Ordnance, an act was passed authorizing the detail to the Ordnance Department of officers from the same grade in other branches of the service, or from the grade below; decreasing the compulsory interval between successive details from two years to one, and lowering the grade at which the compulsory interval should cease from lieut.-colonel to major. These slight changes in the law, involving no increase of expense, were of great significance, since they placed the officers of the Ordnance Department upon a competitive

basis of merit both for entry into the department and for service afterward therein, with the strong incentive of advancement in rank either upon original detail or upon some subsequent one. In case an officer failed to make good all that was necessary was to refrain from redetailing him, after any four-year tour. The method remained in successful practice until our entry into the European War.

With the keen and interested personnel produced by this method of recruitment the best results attended the theoretical course established for young ordnance officers, at the Sandy Hook Proving Ground, for one year's study, under guidance, of the application of their student courses to the design of the artillery and other armament furnished by the Ordnance Department; and equal success was experienced at the Watertown Arsenal, where these officers were given a year's practical work in the foundry, the machine shop, the forge shop and the chemical laboratory, making the same hours as the other workmen. At the end of the year they were not only fair artisans but they had an increased capacity for understanding the workman's point of view.

Incidentally, it may be here stated that in the bills for the organization of the Army now—in the spring of 1920—before the two Houses of Congress the incentive for service in the Ordnance Department is removed; and if either the Senate bill or the House bill shall become a law, without modification in this respect, there will thereafter be lacking the stimulus for the special kind of service herein-

before described which the Department has enjoyed practically since its first creation.

In common with the rest of the military establishment, the Ordnance Department was hampered greatly in its preparations for war by shortage of personnel. The Act of February 2, 1901, after the Spanish War, fixed the number of officers of the department at seventy-one; the Act of 1906, which changed the conditions of detail, increased the number to eighty-five, and the National Defense Act of 1916 further increased it to one hundred and forty-two; but the last Act prescribed that the increase should take place over an interval of five years, so that upon our entry into the war only ninety-seven officers were in the department. Not only was this number entirely inadequate for the performance of the multitudinous duties of the Department, but a considerable proportion of the ninety-seven officers were young men with little experience in their duties, and some of them were under instruction as student officers, giving no aid in carrying on the work of the department, and requiring the attention of more experienced officers for their instruction. This condition, of course, always obtains to an extent in a going organization of professional people, but it was accentuated in the Ordnance Department by the lateness of congressional appreciation of the necessity for increasing its personnel, and by circumstances which attended the outbreak of the war in Europe.

When the nations which afterwards became our associates in the war turned to the United States

for the manufacture of munitions, the absence of civilian engineers skilled in the design and production of weapons of war became at once acutely felt, and the organizations which had secured foreign contracts turned to the only reservoir in the country of the kind of skill which was necessary for them and drew from the Ordnance Department a number of its most expert officers, who resigned from the Army to accept positions of responsibility in their plants.

Such was the state of affairs with regard to the personnel of the Ordnance Department when the war drew us into its whirlpool in April, 1917. A system of providing a reserve of ordnance officers for an emergency had been authorized by the National Defense Act of June 3, 1916, and a few officers had been listed in consequence; but, as with many other features of that Act, there had been no time for effective realization of its purpose. Upon the breaking of relations with Germany, when it became apparent that we would soon be in the war, a special division was created in the office of the Chief of Ordnance and placed in charge of the then Lieut.-Col. C. C. Williams, who afterwards became Chief of Ordnance, for taking charge of the essentially important subject of the recruitment of officers from the numerous volunteers whom the acute conditions then stimulated to offer their services. The division soon grew to five officers and some twenty clerks, of whom all but one officer were themselves new recruits in the department, enrolled since our entry into the war. The one experienced officer

was Major James L. Walsh, who succeeded Lieut.-Col. Williams when the latter went to France with General Pershing, as Chief Ordnance Officer of the American Expeditionary Force. The department had at its ten Arsenals in the United States boards of officers examining local candidates for commissions, of which the proceedings were all reviewed and the qualifications of the candidates summarized for presentation to the Chief of Ordnance by the Personnel Division of the Ordnance office. The division worked days and nights and Sundays at its tremendous task, upon whose performance depended all the other work of the department; for without officers the department, of course, could not function.

A few words as to the numbers involved in this expansion of the personnel. After the war had proceeded a few months, during which a large number of new officers had been inducted into the department, a survey was made of the requirements in commissioned personnel for the fiscal year to end June 30, 1918, as indicated by the experience and outlook at the time of the survey. The number arrived at was 5,373. Of course, not many of these were required to be designing engineers of ordnance, but their duties included administration and executive work, inspection of manufacture and of finished material, supervision of mechanical installations, including metallurgical and chemical plants, the negotiative and legal work of contract making, the custody and issue of munitions, the repair of arms and material in the field, and watchfulness

over the supply of troops as ordnance officers of tactical organizations. For all these kinds of work the department needed and obtained from civil life mechanical, electrical and chemical engineers, metallurgists, professors of various sciences, business managers, financiers, lawyers, and men of some training or aptitude in the handling of bodies of other men. In recruiting for these requirements, the Ordnance Department received substantial help from the American Society of Mechanical Engineers, the American Society of Civil Engineers, the Western Society of Engineers, the Engineers Club of Philadelphia, the American Chemical Society, and various other engineering and technical associations; and also from the Massachusetts Institute of Technology, the Stevens Institute, Columbia University, Lehigh University, the University of Michigan and other technical institutions of learning. Assistance was also received from efficiency engineers with wide professional acquaintance, and from the heads of large industrial and manufacturing establishments employing engineering talent. The examining boards of the arsenals were supplemented by others convened in several of the large manufacturing centers.

By the end of the year 1917, the number of ordnance officers had increased to about 3,000. A large number of applications for commissions had been received, and the carefulness of the scrutiny of the examining boards may be estimated from the number passing satisfactorily, which did not exceed 15 per cent of the applicants. The directive and ad-

ministrative work of the department centered in the office of the Chief of Ordnance at Washington, and the expansion there was in even greater percentage than in the department at large. Upon our entry into the war 10 officers were on duty in the Ordnance Office, the Chief of Ordnance and his assistants. By the middle of December following there were 950, representing an increase of 9,500 per cent. Those of the community who have had any experience in the expansion of industrial organizations can appreciate the task of the Ordnance Department in adjusting itself to an amount of business represented by this augmentation of superior personnel of the officer class. The work of indicating to those best equipped where their field of endeavor lay, of assigning the assistants, and of fitting the multitudes of juniors into the places where the need for them developed with startling rapidity, had to be carried on by the small permanent personnel concurrently with the direction of the country's vast manufacturing resources into the line of military manufacture, and the preparation of estimates of further needs of the department for presentation to Congress. These last duties would have constituted a great task even for an originally adequate personnel.

At the outbreak of the war the Ordnance Bureau in Washington was arranged in divisions, each charged with the provision of a particular class of matériel. There was a Gun Division for cannon and their ammunition; a Carriage Division, for artillery carriages; a Small Arms Division, for

rifles, pistols, and their ammunition; an Equipment Division, for cartridge belts, pack carriers, saddles, bridles, and other articles of personal and horse equipment; and some others. There were also a few divisions not relating directly to matériel, such as the Personnel Division, the Finance Division, etc. Each division having charge of matériel occupied itself with all the principal functions attending the provision of its particular class. That is, it was responsible for the design, including the drawings and specifications; for the procurement through orders to manufacturers and contracts; for the production, which meant watchfulness over the course of manufacture and the facilitation of its progress; and for inspection of the product, to determine its acceptability for use in the service. Information concerning any stage in the provision of a particular article was to be sought in a single division; and the divisions were prevented from attempting to use the same manufacturing facilities, and otherwise kept out of one another's way, by the Chief of Ordnance and his assistants who were close enough to him to be, in a way, a part of himself.

When the war was about nine months old a change was made in the above arrangement, and the divisions were separated along the lines of function, instead of along the lines of classes of munitions to be provided. That is, one division, called the Engineering Division, took over the function of design of all the fighting matériel provided by the department; guns, carriages, small arms, and all the rest. Another, the Procurement Division, placed

the orders and made contracts for everything. The Production Division supervised the processes of manufacture in all factories; and the Inspection Division passed upon the quality of all matériel and workmanship. Each division had a chief and staff, and the new arrangement, in giving each only one kind of function, was supposed to make for simplicity of organization.

The arguments for this kind of segregation of duties are quite obvious, but a little consideration will show that it is possible to carry it too far. No one would advocate the consolidation in a single division of all designing for the Army, the Navy and the Shipping Board; and no one would seek to promote comprehensiveness of grasp of government work by requiring all the orders and contracts for the War Department and the Treasury Department to be placed by one office. Which is to say, that when any business becomes very large it is best to keep the various functions required to prosecute it in relations with each other, and not to detach them from such relations, and unite them with similar functions of other business. Just where the line should be drawn would depend upon the circumstances of a particular case. In the Ordnance Bureau there had been no difficulty in attending to all the functions of providing gun carriages of different types in the single Carriage Division; but it would have been undesirable to spread the functions of design, procurement, production and inspection for the Ordnance Department over the Aviation Service, for example, although both were in the

War Department. The old divisions of the Ordnance Department had each been considered to embody a business of sufficient magnitude to include in itself all the principal functions, and the war brought a tremendous expansion in them. It would, therefore, have been more in accord with previous experience to subdivide the divisions, and retain for each the various functions, but over a restricted class of material, than to expand each function to cover all classes of material, as was done.

Difficulties were encountered with the new arrangement. Responsibility for backwardness of output became obscure, and was almost impossible to locate. And after several months of trial the arrangement was abandoned, and the old one, in principle, restored, with some changes of assignment of work between divisions, and some creation of new divisions to meet enlarged duties; also with some arrangements for coordination between divisions, which, in peace time, the Chief of Ordnance had been able to attend to himself.

The distribution of duties in the Ordnance Office has been dwelt upon somewhat because the change was commented upon as one of excellence which had been forced upon the Department by pressure from the outside. It had, however, often been considered and discussed within the organization and with various efficiency engineers, but through the years had failed to carry conviction of its desirability. Its final abandonment after trial will probably be conclusive as between the two methods.

A new section became necessary because of the

uncertain conditions in regard to the cost of labor and material. Nobody could tell from week to week what the prices of commodities were going to be, and nobody could say what changes were going to take place in the labor market. All kinds of prices were rising rapidly. It was extremely difficult for private manufacturers to take contracts at fixed prices for such articles as guns, carriages or ammunition, and it would generally have been useless to ask them to do so, and take the risk of an underestimate through changing conditions, because the transactions were so large they would have been unable to carry the resulting loss and could not have completed their contracts. The only practicable method, in many cases, was to have the manufacturer do the work and charge to the Government the actual cost plus a sum as compensation for the services of himself and his establishment; which sum was sometimes agreed upon as a percentage of the cost, and sometimes was made a fixed amount per article manufactured.

This method of contracting, commonly called the "cost plus method," required the Ordnance Department to go into the works of manufacturers and supervise effectively the process of keeping account of the cost of work done for the Government, which had never before been done, and necessitated the establishment in the office of the Chief of Ordnance of a cost accounting section as a part of the Finance Division. Mr. Lester W. Blyth, a member of the accounting firm of Messrs. Ernst & Ernst, of Cleveland, Ohio, was invited to accept a commission in the

Ordnance Department and was placed at the head of the new section, which he organized and carried through the war. The section employed and trained some 1,200 accountants during the war, and its personnel reached the number of 13 officers, 58 enlisted men, and 1,990 civilians.

The writer of these pages had the advantage of long enough service at the head of the Ordnance Department to realize the results of a consistent policy. Appointed Chief of Ordnance in 1901, and successively reappointed in 1905, 1909, 1913 and 1917, he was able to hold to his plans long enough to test them, notwithstanding that it took the first five years of his incumbency of office to secure the improved method of recruitment of officer personnel. He continued in charge of the department until we were about half way through the World War, when the officers who had come into the department under the merit system of 1873, and those who had come in under the merit system of 1906, were carrying great burdens of technical and administrative responsibility; some in the department, and a few in private munitions factories in which they had taken positions after having resigned from the Ordnance Department before we came into the war. They formed a small but invaluable nucleus for the able assistance which came to them from civil life.

## II

### EMBARRASSMENTS

The failure of the country during the long period of peace to give attention to military preparation in matters of personnel, which was naturally reflected in a similar failure by Congress, was accompanied by equal neglect in the matter of material. The military material most characteristic of war is that supplied by the Ordnance Department; and for the reason that it is characteristic only of war, it is not naturally produced in time of peace, and the agencies for its production do not arise unless artificially stimulated. The rate of preparation in Ordnance material after the Spanish War was measured by annual appropriations of about $10,000,000 until the year 1916, when, in accordance with the program of the National Defense Act, the appropriation rose to about $100,000,000. As late as 1913, however, it was only $8,138,000. The adequacy of these sums may be judged by the fact that during our nineteen months of war the Ordnance Department expended over $4,000,000,000. The refusal to make larger appropriations was in the face of frequent representations by the Chief of Ordnance, and indeed by all other military officers in position to make recommendations, both as to the necessity for

making more substantial provision and as to the time which would be required to produce the weapons of modern warfare in adequate amount, for a considerable conflict, even after the funds should be furnished.

In a subsequent chapter, on Artillery, I cite certain particular statements to Committees of Congress, in connection with which it should be borne in mind that all other preparations, both in organization, personnel and matériel, can take place faster than the manufacture of arms and ammunition, which therefore sets the pace at which the country can make ready to wage war.

But meagerness of appropriations was not the only handicap under which such departments as the Ordnance had to struggle in the effort to be forehanded on the material side of readiness for war. Here are a few of the others:

Manufacturing Arsenals could, of course, turn out only a small proportion of the munitions needed in a war of any magnitude. There were six of these Arsenals: Watertown, Mass., where the product was sea coast gun carriages and armor piercing projectiles; Springfield, Mass., manufacturing, before the war, rifles, pistols and machine guns; Watervliet, N. Y., making cannon, large and small; Frankford, Penn., making small arms ammunition, artillery ammunition and fire control instruments; Picatinny, N. J., making smokeless powder and high explosives, and Rock Island, Ill., making field gun carriages and other vehicles, artillery harness, personal and horse equipments, targets and rifles. The main-

tenance of these establishments served several purposes. They afforded opportunity for the determination of standards of workmanship, so that these might be embodied in specifications for the government of private manufacturers without giving just grounds for complaint of undue severity; they produced the intimate acquaintance of ordnance officers with the matériel designed and furnished by the department, which can only come from actually making at least a part of it, and they gave rise to knowledge of the cost of manufacture which permitted the department to exercise a reasonable control over the prices charged by private parties for manufacturing in accordance with its designs and specifications. Properly used, they formed an agency of the Ordnance Department of the first importance, but they were not always used with the best of judgment. They should have been employed at such capacity as to require their operation for a single eight-hour shift only in the twenty-four hours, and such matériel as they could not produce when operated to this extent should have been procured by contract with private manufacturers, to the amount permitted by available appropriations. There would thus have been available for the increased requirements of the war, not only the expansibility of the Arsenals to double-shift capacity, or greater, but also the facilities of private factories, with their own possibility of expansion, which would have been familiarized with the manufacture of war matériel for the Government in time of peace. But the efforts of the Department to promote economy of manufacture in its Arsenals had

been so successful as to interfere with its purpose of training private establishments for supplying its emergency needs.

The Government has certain advantages in cost of manufacture over the commercial plant. It can in ordinary times write an interest charge of only 3 per cent, against about twice that amount for the private party. It has to support only actual fire losses, which are not much more than half the cost of insurance. Its superintendence by officers costs much less than the civilian superintendence of private establishments. For example, the Commanding Officer of none of the Arsenals costs the Government more than $7,000 per annum. His actual pay is not over $5,000, and his quarters and other allowances do not exceed the difference between these two sums. A civilian superintendent for an establishment of corresponding magnitude could not be obtained for twice the amount. In addition, the Government has no selling costs, no costs of financing, and makes no profit. On the other hand, the Government has a handicap in its labor cost. It has for a number of years practised the eight-hour day, as against nine hours or ten hours in the private factory. This may or may not be a handicap, since there is evidence to the effect that workmen will do as much in an eight-hour day as in one of longer duration; but however this may be, the Government pays for a considerable amount of time during which it receives no return at all in work. It pays its employees for seven national holidays, for thirty working days of leave, and for thirteen Saturday

afternoons in summer time, which amount to a total of forty-three and a half days; about 16 per cent of the two hundred and seventy remaining working days of the year, not counting Sundays. The Government's advantages probably overbalance this disadvantage, and, coupled with special attention to efficiency of methods, produced, in the years before the war, such economy of manufacture at the Arsenals, in comparison with the prices for which private establishments would do the same work for the Government as to influence Congress to require that appropriations made for the Ordnance Department should be expended in manufacture at the Arsenals, up to the full capacity of these institutions. This policy prevented the use of public funds for the peace time training and encouragement of private manufactures as a reliance for emergency. The disadvantage of the policy was earnestly and repeatedly pointed out by the Chief of Ordnance in hearings before the committees of Congress, when it was stated that the difference in cost was no more than necessary insurance for maintaining the availability of private plants to come to the help of the Government in time of need; but the fear of profiteering overrode the consideration of preparedness, and the restrictions could not be removed.

Another hindrance related to clerical service. Upon the advent of a great emergency calling for the immediate expansion of the operations of such an organization as the Ordnance Department, the very first requisite is the multiplication of the means of communication. Multitudes of letters and tele-

grams must be written and received, and must be properly entered upon the records in order that they may not speedily resolve themselves into a confused mass of papers. Such funds as may be available must be quickly allotted to manufacturing orders, and estimates for new funds must be made up, arranged, tabulated and recorded, for submission to Congress. All of which, and much that is similar, requires the immediate services of many clerks. The headquarters is a nerve center whose impulses must go out to the rest of the organization, and to the agencies which are to be brought into operation, over the desks of clerks. Now, there is a law (22 Statutes, 255) which forbids the hiring in Washington of employees other than those specifically authorized, in number and salary, by law. The appropriations for expenditure outside Washington, as for manufacture at the Arsenals, for instance, do not limit the proportion of the funds appropriated which can be expended for labor, either clerical or any other kind; but in order to employ additional people in any capacity in the departments in Washington it is necessary to submit, for the funds required, estimates which must be in the hands of the Secretary of the Treasury by the 15th of October, with explanation of the necessity for the employees required, who, if the explanations are satisfactory to Congress and the funds are appropriated, may be employed on the first of the following July. The jealousy with which this restriction is guarded by Congress may be appreciated from the fact that in one of the years shortly

preceding our entry into the war, I submitted an estimate for an increase of nine in the force of about one hundred clerks of the Ordnance office, and appeared before the appropriate committees in argument for the authorization. I secured authority to employ six of the nine whom I had asked for. When we came into the war the number of pieces of mail, incoming and outgoing, handled by the clerical force of the Ordnance Office was in the neighborhood of five hundred per week; by December of the same year pieces of outgoing mail alone had risen to more than one thousand per day. The office was greatly embarrassed in the early part of the war by lack of authority to increase its clerical force, which was sought earnestly from Congress but was granted only grudgingly and after much delay and inconvenience. The extent to which additional force was required is shown by the increase from about two hundred at the declaration of war to about forty-five hundred in the following December.

Office space was another trouble. For the accommodation of the additional officers and clerks there was, of course, needed at once additional office room. The space in the War Department building was filled to overflowing, and room for expansion could only be secured by renting buildings about the city. But there is a law (19 Statutes, 370) which prohibits the renting of office room in Washington, unless authorized by an appropriation for the specific purpose. The same process of estimating and explaining as in the case of employees is therefore necessary. We were, in consequence, up against

the same kind of embarrassment, notwithstanding strong representation to Congress, as in the other matter, the extent of the embarrassment being apparent from the comparison of the floor space occupied by the Ordnance Department when we entered the war, some fifteen thousand square feet, with that occupied at the end of the year, which was about six hundred and ten thousand square feet. Congress had not failed to pay some attention to the statement of needs, and made appropriations for large temporary buildings; but this was not until June, and the buildings were not ready until the end of the year; and, in the meantime, the authority of the Department to help itself as best it might was quite inadequate. In December of 1917 the Ordnance Office was scattered about Washington in fifteen different buildings; during the painful acquisition of which there were frequent intervals when clerks had to use their typewriting machines on window-sills or take them to their lodgings to perform their work, and at one time of special congestion a number of officers clubbed together and with their own funds hired a loft over a garage, and fitted it up with temporary divisions as office room for themselves and their clerks. These officers had recently joined the department from civil life, and their action was illustrative of the fine spirit which prevailed in the department's personnel.

In putting into hasty operation an immense program of manufacture of articles not theretofore produced in large numbers, as in the case of artillery,

it was often necessary to provide for the radical extension of existing plants or for the construction of new plants. Here a whole series of legal obstacles was encountered. Plant almost invariably involves buildings and machinery, and it had been the practice of Congress to provide for machinery by special appropriation, or by special wording in an appropriation for the procurement of manufactured articles. For example, there would be an appropriation of a specific sum for artillery ammunition, with the words added "and for the machinery necessary for its manufacture at the Arsenals." With this wording the Department was free to use such proportion of the appropriation as it thought proper in purchasing and installing machinery, provided the machinery was to be used at an Arsenal. But some of the appropriations did not have this wording, and Congress would not add it in all cases; and besides, the usual case which arose in our war proceedings was one in which machinery was to be purchased for use elsewhere than in an Arsenal, as in a private plant whose construction or enlargement was financed by the Government. As no prohibiting statute could be found covering this point, however, we secured a legal opinion that the preceding practice did not have the effect of law, and that appropriations for procurement could be lawfully expended for machinery required in manufacture.

But with buildings it was different. There is a law (Revised Statutes 1136) which states that "buildings and structures of a permanent nature shall not be constructed unless detailed estimates

shall have been previously submitted to Congress, and approved by a special appropriation for the same, except when constructed by the troops; and no such structures, the cost of which shall exceed $20,000, shall be erected unless by special authority of Congress." And there is another law (Revised Statutes 355) which prohibits the expenditure even of funds which may be specially appropriated for the purpose, upon any land purchased for the erection thereon of public buildings, of any kind whatever, until the written opinion of the Attorney-General shall be had in favor of the validity of the title, and until the consent of the legislature of the State in which the land is situated has been given. And there is still another law which prohibits the purchase of land except in pursuance of an appropriation specially made for the purpose. By these laws, although we had hundreds of millions of dollars for the procurement of war material, we were embarrassed in the expenditure of the funds for the plants essential to its production. We met the obstacle as to the use of the appropriations for the erection of buildings by deciding not to put up any of a "permanent nature," and thereafter large sums were expended for temporary structures. Although these were to house power plants and other great groups of machinery, they had to possess the strength required to support enormous traveling cranes, and necessarily involved the use of a great deal of concrete and other masonry in their construction, there was so much use of steel shapes that it was possible to take them apart and remove them,

which was construed as bringing them within the definition of the term "temporary," and thus as permitting their erection without specific appropriation, and upon leased land not belonging to the United States.

But these constructions of the laws, perhaps somewhat strained, did not relieve us from the prohibition to expend funds upon any kind of public buildings whatever, which were to go upon purchased land, until after the inadmissible delay required to secure the opinion of the Attorney-General upon the title, and the action of the state legislature. An Act had been approved on July 2, 1917, relieving the department from the operation of this prohibition with reference to land purchased for works of fortifications, coast defenses and military camps; and the War Department sent communications to Congress requesting that the relief be extended so as to cover the class of cases mentioned above; but no action could be secured upon the request until, on the last day of the special session of Congress of 1917, the Hon. Swagar Sherley, of the Committee of Appropriations of the House of Representatives, personally took up the matter, and through his intimate knowledge of congressional methods and his high personal standing with the leaders of both Houses secured the passage of a joint resolution relieving the Ordnance Department from the restriction of this law.

Of course, these hampering laws were not enacted in mere wantonness. They were designed usually to correct some abuse, and for reasons which, in

most cases, would probably have been considered good; but they took no account of the interference which they occasioned with effective preparation for war, which always had to give place to considerations of economy or political expediency. On many occasions I represented to Committees of Congress not only the current embarrassment which these restrictions were causing in the operations of the Ordnance Department, but the tremendous handicap which they would cause if the Department should suddenly be called upon to act with maximum energy in order to meet a great emergency; and in this I was not alone, but I imagine that I was supported by every other bureau chief of the War Department. My representations did not prevail, and no one of the restrictions mentioned was lifted until after we got into the war. Thereafter relief was so slow and partial that it was not until the end of the year that, by legal construction and by congressional action, we got the obstacles so smoothed out or circumvented that necessary measures could be taken without much loss of time in devising ways of doing business without violating the law.

These legislative hindrances, and others which I do not mention, make part of the long list of everything else than making ready for war which had been piled upon the departments in peace time. They consumed an inordinate amount of the time of administrative officers at a period when they had far too little time to attend to other phases of their multiplied duties. Their removal was one of the slowest mobilizations of the war.

Another cause of delay was the slowness with which appropriations were made for prosecuting the war, after we entered it, although estimates were promptly submitted. It will be remembered that a military program was adopted by the Act of June 3, 1916, in accordance with which an armed and equipped force of about a million men, regulars and auxiliaries, was to be brought into existence in five annual installments. The equipment of the first installment had been provided for by appropriations made in the summer of 1916; that of the second was embodied in estimates which were before Congress for action in the winter of 1916 and 1917, but the larger part failed of consideration because of a filibuster in the Senate over the Shipping Bill which lasted until the end of the session on March 4, 1917. They were taken up at the extra session called April 1st, upon severance of the relations with Germany, and were passed on May 12th. These estimates were in the form in which they were usually required to be submitted; that is, they specified in considerable detail the different classes of objects for which funds were needed, such as small arms, field artillery, machine guns, etc., and the amounts required for each; and, of course, their preparation required considerable time. Therefore, when the war came upon us, and it was necessary to send in quickly estimates for arming and equipping a large force, the best course was to compress into one the estimates which had already been made for the remaining increments under the five-year plan, and send them to Congress immediately. This was

done, and the estimates reached that body on April 5th, the day before the declaration of war.

But when appropriations are made after the itemized manner mentioned above, the sums appropriated for one class of object are not available for any other class, notwithstanding any shortage or surplus which may arise as between classes; so in sending in this large estimate for the first great sums for prosecuting the war, the War Department did not itemize them, but asked for a lump sum of about $3,000,000,000 for all purposes involved in carrying on the war; this for the reason of avoiding a failure of funds for any necessary purpose which might have been overlooked, or have been inadequately provided for. But this was too great a departure from the usual methods for acceptance by Congress, and the Committee in charge of the measure required from the chiefs of bureaus which had made up the estimates, information upon the various items making up the total, so that they might be separated in the appropriation act into the usual classes, with the judgment of Congress separately exercised as to the amount required for each, and the discretion of the War Department as to expenditures between classes, or for objects not mentioned, denied. With respect to the Ordnance Department, I endeavored to secure a limited discretion by requesting the committee to authorize the expenditure of as much as 10 per cent of the amount appropriated under any heading, for any purpose necessary in the judgment of the Secretary for the prosecution of the war; but although the

committee was liberal in recommending the appropriation of the full amount asked for in each case—and Congress afterward granted the sum—the latitude required in expenditure was not allowed.

The time required for the explanation of the items of the great bill was such that it did not become law, and make the funds available for use, until the 15th of June. It could scarcely have been expected sooner in view of the number of items which, in accordance with the method pursued by the committee, required separate examination. Samples of these items were: Clerical Force, $900,000; Military Observers, $85,000; Signal Service of the Army, $47,267,766; Court Martial Expenses, $190,000; Mileage of Commissioned Officers and Field Clerks, $510,000; Subsistence, $133,000,000; Small Arms Ammunition, $131,048,000; Machine Guns, $65,900,000; Field Artillery, $195,000,000; Field Artillery Ammunition, $367,000,000; Proving Ground Expenses, $600,000. These were some of the items, for which, as stated above, the appropriations were not available for any other purpose than the one specified, either as between the items themselves or for others whose need was not foreseen. The absence of appropriations during the time the bill was in Congress was met to a certain extent by the assumption of responsibility by administrative officers, who placed orders without authority and in direct violation of law. These orders were accepted by manufacturers and others in faith that the officers would be sustained by the action of Congress and that the orders would be made good. But

no money could be paid out of the Treasury pursuant to these orders in advance of an appropriation, and no contract based upon them could be entered into; the parties who undertook them therefore had to furnish their own finances for an indeterminate period, which was the more difficult for them to do in that they had no contracts with the Government upon the strength of which they could borrow money from the banks. Of course, all these matters were ultimately straightened out, but they made for delay and embarrassment in the first months of the war, when the officers of the War Department were engaged in their hardest struggle to get the wheels in motion.

Before the first large Appropriation Bill became a law, the need for additional expenditures had become apparent. It was evident to the Ordnance Department, for example, that the amount of Field Artillery which its first estimates contemplated—appropriate for an army of about 1,000,000 men—would not be sufficient for the much larger army which it was already seen it would be necessary to put in the field. Estimates were therefore prepared in the Ordnance Department for the artillery for a second million men; and as it was necessary to commence as soon as possible the arrangement for its manufacture, and even so it could not be ready as soon as the men would be, it was desirable to have the estimate acted upon at the earliest practicable date. As soon therefore as the estimates were ready, which was in the early part of June, I requested an interview with the Secretary of War and the Chief

of Staff together and submitted them, explaining their necessity. This was at once understood by these officers, and the estimates were sent to the General Staff with instructions for the proper officers of that body to consult with me, and prepare to include the estimates with others for transmission to Congress by the Secretary of War. The officers came promptly to my office and we had a harmonious consultation; after which they returned to their associates of the General Staff and put the estimates into the shape which they considered appropriate for the action of the Secretary of War, courteously sending me a copy. But it appeared that there had not been entire mutual comprehension between their office and mine, and it was necessary for me to send an officer to the office of the General Staff in order to clear up the misapprehensions. This was done without friction, and the estimates were finally perfected in form and amount. This process, however, took such a long time, together with that required by other somewhat similar processes for the Ordnance Department and the other bureaus of the War Department, that the estimates did not reach Congress before August 2nd.

I mention these details as another illustration of defects in our governmental methods, under which there is so much checking of one agency by another, and so much review of discretion which ought to be final, under responsibility, that prompt action in emergency is impossible. In this example a pressing estimate which was ready in the department in direct charge of the subject in the early part of

June, did not reach Congress until nearly two months later, notwithstanding the best of good will and the absence of strong difference of judgment on the part of all concerned. The system called for the review of the judgment of the Chief of Ordnance, who knew perfectly well what was required, by the General Staff, who undoubtedly worked as diligently at its task as any set of men could; and in the end it formed no better agency to be held responsible for results than did the Ordnance Department. The estimates were subjected in Congress to the same detailed scrutiny which had been bestowed upon those submitted at the declaration of war, and the Appropriation Bill was not passed until October 6th. It carried about five and a half billion dollars, of which about three and three-quarter billion were for the Ordnance Department.

## III

### OVERHEAD ORGANIZATION

We have become somewhat accustomed to the mention of the great sums of money which have been used in the prosecution of the war; but their like have never before figured in the transactions of mankind. The first large Appropriation Bills carried, as has been stated, something over eight and a half billion dollars, and of this sum over four and a half billion dollars were for the use of the Ordnance Department alone. The mention of the amount conveys little significance as to the effort involved in its utilization, and the labor and thought required for its useful expenditure. For a series of years before our entry into the World War, the annual expenditure of the whole United States Government had been about one billion dollars. To properly direct the activities set in motion in expending this sum required the services of the numerous well trained and competently headed departments of the Government, including the State Department, the Treasury Department, the War Department, the Department of Justice, the Post Office Department, the Navy Department, the Department of the Interior, the Department of Agriculture, the Depart-

ment of Commerce, the Department of Labor, each with its cabinet officers and assistant secretaries; and various other money-spending agencies, such as the Smithsonian Institute, the Interstate Commerce Commission and the Houses of Congress themselves. The mere enumeration of these organizations brings to mind an array of distinguished names of men engaged, with staffs of sub-directors of all kinds, in the proper expenditure in the course of a year of a billion dollars. We realized that the business was immense, and were proud of the Government whose greatness was illustrated by it. Now in six months there was thrown upon the Ordnance Department a task of directing and controlling human energies which was pecuniarily measured by four times the entire Government's measure of its yearly accomplishment; and it had to be carried out as a breathless race against time, while concurrently expanding the organization for performing the task from a size appropriate to one of about a five hundredth of the magnitude. And the Ordnance Office was a single bureau of a single department.

At the outbreak of the war, therefore, the Government was confronted with an immense question of overhead organization for carrying it on, and it was a very reasonable inquiry whether our governmental organization, which had been developed to meet the country's peace time needs, would answer for the very different war time needs. We had before us the example of the British Empire, whose two and a half years' experience had led it to at least two very great changes in its governmental machinery.

One of these changes was the creation of a War Cabinet, consisting of the Prime Minister and six additional members, only one of whom, the Chancellor of the Exchequer, had the portfolio of an executive minister. The others had no departmental work to perform, and were free to give all of their time to what might be called matters of policy. When the affairs of any one of the administrative departments were under consideration by the War Cabinet, the minister at the head of that department sat with it; otherwise the ministers attended only to the affairs of their own departments. Thus the War Cabinet relieved the ministers heading executive departments of the collective responsibility which they had theretofore exercised in carrying on the government.

Another great change was the creation of several new executive departments. Of these there were nine, namely, the Ministry of Munitions of War, the Ministry of Labor, the Ministry of Pensions, the Ministry of National Service, the Ministry of Reconstruction, the Ministry of Blockade, the Shipping Comptroller, the Secretary of State for Air, and the Food Comptroller. The greatest of these new departments was the Ministry of Munitions.

The great change of conditions upon our passage into a state of war, which rendered the contemplation of some such agency as a Ministry of Munitions necessary, was the transition from a state in which the various supply departments of the Army and the Navy had been going into an abundant market and drawing from it their necessaries, limited by

small appropriations, to a state in which these departments had to be kept out of one another's way when pressing for the supply of enormously increased necessaries in a market which had become entirely inadequate. The Ordnance Departments of the Army and Navy were the only agencies available, or which could be expected, to say what the Government wanted in the way of munitions, to describe them in specifications and to state the amounts. These departments in peace time had at their disposal in the Government factories and in private plants abundant capacity for supplying their needs, and for insuring fair prices by competition. The departments, however, had had no experience in searching out manufacturing facilities, in bargaining for just prices, or in allocating to one another, in accordance with the pressure of their respective needs, a limited capacity for production. For these purposes, therefore, they had need of a general coordinating and supporting agency outside themselves. The support was especially needed for assuring the public that prices paid would be reasonable, in the necessary abandonment of the competitive basis, resulting from there being more than enough work for everybody with a plant.

There had been created by law before the war a Council of National Defense, for the consideration of Governmental policies relating to military preparation; and an Advisory Committee and other subordinate bodies had been provided for as aides to the Council. Subsequently, after we had been something over a year at war, there was enacted

what had been known as the Overman Bill, giving to the President the authority to create new executive agencies for carrying on the war, and to redistribute the duties of those which were existing. Under the earlier statutory authority there was created a General Munitions Board of the Council, which was superseded on July 12, 1917, by the War Industries Board, created by the Council with the authority of the President for performing, in connection with the supply departments of the Army and Navy, such duties as are indicated above, in which the departments required outside assistance.

It does not require much demonstration to show that the situation with reference to the method of procurement of the armament and other supply of the forces was a dangerous one. Owing to long national neglect of military preparation the problem was immense, and the necessity for some changes and additions in the means of meeting it was apparent. The great governing powers of the country had given little thought to such a subject; and the point at which paralyzing conservatism adhering closely to antiquated methods and inadequate mechanism, and dangerous radicalism urging the substitution of new and untried agencies for the established governmental departments which had well in hand an unknown capacity for dealing with the situation, would meet in compromise, was entirely problematical. Shifting of the point too far either way might easily result in disaster. In the excitement of a tremendously stirring situation, radical-

ism had a great call, and there was strong pressure for the substitution of new bodies, of civilian membership, for taking over the procurement of munitions and other military supplies.

Into this turbulent situation, to the great good fortune of the Government, there came a man of sanity, to a highly important position, Mr. Frank A. Scott, a manufacturer, of Cleveland, Ohio, who was appointed Chairman of the General Munitions Board. After consultation with the heads of the departments to which his body would have to give assistance, he clearly perceived the lines along which this assistance would be appropriate and helpful, and stuck to these lines during the formative months of the munitions policy. His experience enabled him to realize that the departments of the Government whose organizations had been developed through long practice in the design, purchase, manufacture, custody, issue, use in the service, and maintenance in repair of munitions of war, must of necessity be better qualified to carry on these functions in an enormously enlarged degree than any new organizations which could be created by a lot of people with power, who knew very little about the subject, and he addressed himself to the difficult task of holding to these organizations the functions to which they were accustomed. He did not fail to appreciate, however, that the Government bureaus needed a great deal of assistance for which the acquired knowledge and the unremitting industry of a large number of civilian business men would be necessary.

The assistance needed was divided into three general classes:

(1) Finding and presenting to the supply bureaus capacity, in plant and organization, for meeting their needs.

(2) Allocating among the different bureaus the productive capacity found, in order that their needs might be supplied in the proper order of priority; as compared with one another, with the Allied Governments, and with the needs of the civil population.

(3) Insuring the interests of the Government and safeguarding the reputation of purchasing officers by giving advice upon the subject of prices, which could no longer be controlled by competition.

The wide acquaintance of business men with private establishments, which the Army and Navy officers did not have, was useful, in furnishing knowledge of available resources which the experience of the officers had necessarily left them without; but such an establishment having been placed at the disposal of a supply department, the officers of that department were qualified, as no other persons could be within a reasonable time, to conduct negotiations to utilize the establishment for making something for the Government, in which negotiations, design, specifications, quantity, urgency, and the nature of the inspection were essential considerations. The business with the given establishment, with the exception of advice in regard to compensation, was, therefore, left to these officers.

The matter of allocation and priority involved an

understanding of the relative urgency of different military supplies, of the capacity of manufacturing establishments and their degree of occupation, of the possibility of finding untapped resources, and of the status and prospect of the supply of raw materials. It required, therefore, both civilian and military knowledge for its handling, and the Priority Committee of the War Industries Board had in consequence to include both military and civilian membership.

The prompt comprehension of the situation by Mr. Scott, and his guidance of the General Munitions Board and of the War Industries Board along the above described lines during the early months of the war, insured the full utilization of the Government's existing agencies and the supply to them of necessary outside help, without the disruption, and the long process of finding itself by a new organization, which would necessarily have accompanied the substitution of new machinery for that which had been already tried and was in large part adequate for the emergency. The Government owes a wonderful debt of gratitude to Mr. Scott and to the level-headed and experienced civilians who supported him as members of the auxiliary bodies aiding in the conduct of the war.

The War Industries Board carried on its work under the presidency of Mr. Scott through the difficult formative period of the summer and autumn of 1917, when his health failed temporarily under the great strain, and he was succeeded by Mr. Daniel Willard, who resigned and resumed his duties as

president of the Baltimore and Ohio Railroad in January of 1918.

At the meeting of the United States Congress in the winter following our entry into the War, bills were introduced for the creation of a War Cabinet and a Department of Munitions. Neither of these bills became a law; but there is probably difference of opinion to-day as to whether they should not have been enacted, especially the one for a Department of Munitions. The last named department would necessarily have had very close relations with the Ordnance Department, both of the Army and the Navy, and would in all probability have absorbed the greater portion of these departments, if it had been created. The British Ministry of Munitions took over at first only the placing of orders and contracts and the following up of the production of munitions; but it was soon found that these activities were so closely connected with design that it was necessary to take over also the design of the articles which were procured, leaving the Ordnance Department only the custody, issue and maintenance in the service of the material. That is, the Ministry of Munitions transferred to its own organization the personnel of the Ordnance Department, which had been engaged upon design.

On March 4th, the President made something of a change in the character of the War Industries Board, by assigning Mr. Bernard M. Baruch to the chairmanship, and directing that the ultimate decision of all questions, except the determination of prices, should rest with him, the other members acting in

a co-operative and advisory capacity. The President at the same time outlined the formation of a price-fixing committee to consist of the chairman of the board, the members of the board immediately charged with the study of raw materials and of manufactured products, the labor members of the board, the chairman of the Federal Trade Commission, the chairman of the Tariff Commission, the Fuel Administrator, a representative of the Army, a representative of the Navy, with Mr. Robert S. Brookings as chairman. This committee received its instructions directly from the President and made its reports directly to him. The President at the same time took occasion to re-define the functions of the War Industries Board, and stated among the duties of the chairman to be:

1. To act for the joint and several benefit of all the supply departments of the Government.

2. To let alone what is being successfully done and interfere as little as possible with the present normal processes of purchase and delivery in the several departments.

3. . . . . .

4. To determine what is to be done when there is any competitive or other conflict of interest between departments in the matter of supplies; for example: when there is not a sufficient immediate supply for all and there must be a decision as to priority of need or delivery, or when there is competition for the same source of manufacture or supply, or when contracts have not been placed in such a way as to

get advantage of the full productive capacity of the country.

. . . . . .

These instructions were in general accordance with the ideas which had governed since the establishment of the General Munitions Board. They indicated a policy different from that which had been followed by the British Government in the formation of a Ministry of Munitions, in that they crystallized the method of making the greatest use possible of the existing designing, purchasing and manufacturing departments of the Government. The time which would have been necessary for a great new department, spreading over all the activities of procurement of munitions of war, to find itself, gathering together its personnel and installing its methods of doing business, was therefore saved; and it appears that the outcome justified the system followed, since the wheels of industry were set turning for the Government's purposes with a minimum of delay, and with a promptness of delivery of output comparable favorably with that in any other country. The only change of agency, of any moment, was the creation of the Division of Purchase, Storage and Traffic, of the General Staff, which was to take over the purchase, for the Army, of the class of stores which could be called commodities and were made commercially instead of being manufactured from designs. This division, however, did not get into operation until about the end of the War, and did not have opportunity to justify its existence. Its creation had been inspired by the belief that any

commodity, such as blankets, for example, which had been purchased for horses by the Ordnance Department and for men by the Quartermaster Department, would best be handled, from procurement, through transportation and storage, to final issue to the ocean transport service, by a single agency; for which there was much to be said. But the field which it was attempted to cover was very great, and much knowledge had to be acquired by the new division, which was already in the possession of the regular departments; so that difference of opinion as to the success of the undertaking was never smoothed out.

Altogether, although the question may always be arguable, I think it can be said that the achievement of putting in the theater of war a million and a quarter of fighting troops in eighteen months, with never any embarrassing shortage of arms or ammunition, is a justification of the policy of using existing governmental departments, and expanding, aiding and co-ordinating them, by outside assistance, instead of replacing them by an all-absorbing department after the emergency was upon us. The subject has special interest because of the intense effort which was made to impose a course more nearly resembling that of the British Government, and because of the natural sympathy which was expressed for this effort in lively public discussion.

In speaking thus I have in mind the regularly constituted and already functioning military departments, and refer to their operation within their respective spheres. I have no failure of apprecia-

tion of the work of the War Industries Board in helping the military departments in matters beyond the scheme of their creation or practice, nor of the several other boards which were set up under the Overman Act or under special legislation, to perform tasks which either were not tasks of normal times, or were then performed by private agencies. The War Finance Corporation, the War Trade Board, the War Labor Board, the Food Administration, the Fuel Administration, the Alien Property Custodian, and the Bureau of War Risk Insurance show how large a field there was which could best be occupied by civilian personnel, and indicate the abundant necessity for constructive organization of new administrative bodies, without infringing upon or duplicating the duties of the old ones.

## IV

### CRITICISMS

The special session of Congress which had been called by the President to meet the emergency occasioned by Germany's resumption of ruthless submarine warfare, in February, 1917, came to an end on October 6th, when the Houses adjourned after the passage of the appropriations asked for, and the enactment of much other legislation for the prosecution of the war. The membership were in rather cheerful mood, with an apparent consciousness of having worked hard and done their duty. It is true that the appropriations had been slowly made, but they were altogether liberal in amount; and, although all the special legislation asked for by the executive departments had not been granted, the response had been so much more complete than in normal times as to produce a feeling almost of generosity in the minds of legislators.

But when the statesmen had scattered to their homes, and had had opportunity, many of them, to observe the great gap between the making of appropriations and the fulfillment of the objects for which the appropriations were made, as exemplified by the shortage in arms, equipment and shelter of the troops who had been gathered at the mobilization

centres, the feeling of satisfaction suffered a rude shock; and there was realized the danger of dissatisfaction throughout constituencies, which is apt to appear as unmixed evil to the sensitive perception of the dependent upon popular suffrage. So, when the 65th Congress came together again for its first regular session, in the first week in December, a disposition was evident to make searching inquiry as to why troops were still without guns and clothing, after eight months of war and billions of appropriations. The military committees of the two Houses were appropriate bodies to examine, on behalf of Congress, into the conduct of the war; but a simultaneous examination by both committees would have involved duplication of effort, and double expenditure of time by testifying officers; so the Senate Committee only took up the task, and commenced its "Investigation of the War Department" by calling the Chief of Ordnance before it on December 12, 1917.

I think that more members of the Senate Committee were surprised, and perhaps dismayed, by the shortage of equipment than could have been found in the House Committee. The needs of the War Department were usually presented, during what ought to have been the years of preparation, in connection with appropriation bills, and these were much more thoroughly considered by the House Committees than by the Senate Committees; more extended hearings were held, and explanations as to deficiencies of supply and the impossibility of making them up quickly, upon emergency, were more

extensively gone into. All of which may have given the House membership a better understanding of conditions than was to be found in the Senate Committee, and more of a realization of the time that would be required to make up for the years which had been lost. However this may be, a number of the Senate Military Committee members conducted their part of the examination of officer witnesses in a manner to indicate their indignant astonishment at what they considered inexcusable failure to show more prompt results from the resources which had been placed at the disposal of the War Department. The sessions of the Committee were usually public, so that the dissatisfaction of these Senators was exhibited before press representatives, and found a loud echo throughout the country. The Committee did not report any result of investigation or conclusions arrived at, at least in respect to the Ordnance Department; but individual senators criticized and condemned freely, both in speeches on the floor of the Senate and in other public utterances. They did this in such apparent disregard of the evidence which had been given before the Committee by all responsible witnesses as to indicate, on the part of these critics, a refusal to attach weight to the information given them by those who were in special position to impart it, and a disposition to give full credence to the small number of faultfinding witnesses, even when the latter had an evident motive for misrepresentation. Such widespread charges of inefficiency and incapacity resulted from this action on the part of a few Senators that I think it is worth

the time required to look into the most important subjects which were dealt with, relating to the Ordnance Department, and to show if possible whether the organization which the taxpayers had been maintaining was hopelessly defective, both in character and in personnel, or whether it functioned, in the emergency, as well as there was any right to expect, under the handicap of long-continued inadequacy of support for which some of the most severe legislative critics had not been without responsibility.

I do not intend to make a general review of the accomplishment of the Ordnance Department in the production of war material. That has been done by the Assistant Secretary of War and Director of Munitions, Mr. Benedict Crowell, in an interesting report published by the War Department under the title "America's Munitions—1917-1918," and by the Chief of Ordnance in his annual reports. But there were four subjects, viz.: rifles, machine guns, field artillery and smokeless powder, upon which criticism centered so fiercely and in regard to which misinformation was so rife that the truth really ought to be known about them; especially as they constitute the most important items in the armament of a fighting force. I shall therefore, in the following pages, tell the story of the controversial points as to these items, and leave readers to judge whether or not they have heretofore been given a just apprehension of them. It would be much pleasanter simply to state the record of good achievement, without attempt at defense, which is never agree-

able, and let it go at that; but if the history is to be of any use as a guide for the future it is difficult to see how there can be avoided an examination of at least the more serious charges prominently made.

The examination calls for more extended quotation from public speeches and from recorded testimony than would be appropriate in a story written to make interesting reading; but these constitute respectively the indictment and its support, and are necessary to a real understanding of the phase which I am endeavoring to make plain.

# V

## RIFLES

The most important weapon with which nations go to war is the infantryman's rifle. This remains a fact notwithstanding the greatly increased importance of artillery, the extensive use of the machine gun, the revival of such early weapons as the hand-grenade and the trench mortar, and the introduction of new ones such as the aeroplane and asphyxiating gas. The rifle was, therefore, a matter of very early concern with the Ordnance Department upon entering into the war, as, indeed, it had been for a considerable time before.

The standard rifle of the American service, popularly known as the Springfield, is believed to have no superior; but our supply was entirely insufficient for the forces which we were going to have to raise. Our manufacturing capacity for the Springfield rifle was also insufficient, and could not be expanded rapidly enough for the emergency. This capacity was available at two arsenals: one at Springfield, Massachusetts, capable of turning out about a thousand rifles per day, and one at Rock Island, Illinois, which could make about five hundred per day. Until September of 1916 the Springfield Armory had been, however,

running far below its capacity, and the Rock Island Arsenal, or at least the rifle-making plant, was entirely shut down, due to lack of appropriation. At the end of August, 1916, there had been appropriated $5,000,000 for the manufacture of small arms, including rifles. A considerable sum of this appropriation had to be put into pistols, of which we were even shorter than we were of rifles, but the remainder was used to reopen the rifle plant at Rock Island, and to increase the output at Springfield, as rapidly as these effects could be accomplished in the stringent condition of the supply of skilled labor occasioned by the demands of the private factories making rifles for European governments. The dissipated force could not be quickly regathered. Fortunately, it had been the policy of the Ordnance Department to keep on hand a considerable reserve of raw material, so that little delay was caused by lack of this important element. We had in April, 1917, about 600,000 Springfield rifles, including those in the hands of troops and in storage; and the question was as to the best method of rapidly increasing our supply of rifles, of sufficiently good model to justify their procurement.

Six manufacturing establishments were making rifles in the United States for foreign governments, and of these, three, the Winchester Repeating Arms Company, of New Haven, Connecticut, the Remington Arms Company of Ilion, New York, and the Remington Arms Company, of Eddystone, Pennsylvania, were making what was known as the Enfield rifle, for the British service. The capacity of these

three plants was sufficient for our purpose, and as their contracts with the British Government were running out, and the general type of the rifle which they were making was a good one, it was not difficult to decide that these plants should be used to supplement those at Springfield and Rock Island, which should, of course, be stimulated to their utmost production. Certain other questions, however, at once arose. The British type of ammunition, for which the Enfield rifles were being made, was not a very good one, in that the bullet was of low velocity and the cartridges, having a projecting rim at the base, were likely to catch upon one another in feeding from the magazine, and to produce a jam. In addition, this ammunition was not interchangeable with our own, and could not be used in the Springfield rifle. The manufacture, for ourselves, of the Enfield rifle as it was being made would, therefore, have entailed the use of two kinds of ammunition in our service,—and one of these not a very good kind,—or else the abandonment of our Springfield rifle and the complete substitution of the Enfield, with the corresponding throwing out of commission of the Springfield and Rock Island plants and the Government ammunition factory at the Frankford Arsenal.

There was another difficulty about the Enfield rifle. It was being independently manufactured at the three factories, and there was not only very poor interchangeability of parts in the product of a single factory, but as between the three factories the parts were not interchangeable at all. Under these cir-

cumstances, and in view of the moderate supply of Springfields on hand and the manufacturing capacity of the arsenals, it was decided that the new Enfield rifles should be manufactured for use with the United States' ammunition, and that the manufacture should be standardized so as to effect practical interchangeability of parts throughout.

It was considered that the Springfield rifle situation justified taking the time required for these changes, of which the first would necessarily appeal strongly to any military man, and the one involving interchangeability could, fortunately, be considered with the aid of an officer who was very familiar with the Enfield rifle as it was being manufactured at the three private factories. This officer was Colonel John T. Thompson, formerly of the Ordnance Department, who had been retired from active service and was in the employ of the Remington Arms Company in connection with their rifle manufacture for the British. I called Colonel Thompson back into active service and placed him in charge of small arms and small arms ammunition, and had the benefit of his expert and especially well-informed advice in deciding that the interchangeability wanted would be worth its cost in time.

Action in accordance with this decision raised serious criticism from various sources with a capacity for making themselves heard. That most formally expressed was by Senator Chamberlain, in a speech on the question of personal privilege in

the Senate, on January 24, 1918, in which the Senator spoke as follows:

"Let us now consider the question of rifles.

"We were furnishing Lee-Enfield rifles to the British Government in large numbers. The factories were prepared for them. It is true that Great Britain was trying to make an improvement upon the rifles used by her when she became involved in the war, but when the war came on Great Britain said we will not waste any time improving our rifles, but will get them out just as fast as we can, and they have been manufacturing them ever since. What did America do? With 700,000 rifles in America and in our colonial possessions, a motley group of different kinds of guns, America was seeking, through the Ordnance Department, to improve the rifle that Great Britain was manufacturing here and which we could have put out without any trouble in the factories. We went to work, through the Ordnance Department, to improve the Enfield rifle. I am frank to say it is a great improvement. I believe it is a better gun than the English gun, but here while the house was burning America was determining through its Ordnance Department what instrumentalities ought to be adopted to put out the fire. It took weeks and months before they finally got the Lee-Enfield rifle into condition where the Ordnance Department thought it was all right. And after this was agreed upon there were further delays caused by indecision. Here were the engineers of these great arms companies, who got together and finally agreed upon a program for the manufacture of

these guns, and concluded that they would manufacture them with seven interchangeable parts, and they started to manufacture the gauges, the jigs, and dies, and everything necessary for the manufacture of guns with seven interchangeable parts. After the Ordnance Department had practically accepted the suggestion, it went to work through a distinguished ordnance officer and changed the plan from 7 to 40 interchangeable parts, and finally raised it to over 50 interchangeable parts, with the result that everything had to be stopped for awhile that additional gauges might be made. This may have resulted in improvement, but why the delay in the midst of the smoke of battle?"

Senator Chamberlain's position as Chairman of the Military Committee, and the fact that his speech followed an extensive investigation of the War Department by the Committee, gave to his utterances a particularly important character, and caused them to be very widely published throughout the country, undoubtedly to the considerable impairment of the public confidence in the manner in which this important matter of rifles had been handled by the department. Senator Weeks, also of the Committee, joined in a criticism of the department, saying in regard to myself, "He had constantly sought—justifiably so in ordinary times—for the best the market could produce, and in this case he was unwilling to modify that standard of perfection even though a modification would have greatly hastened the production of a satisfactory arm, and one which would have answered all purposes." After review-

ing some of the reasons which had been advanced in defense of the change, the Senator continued: "But all of these arguments in favor of the change did not commence to overcome the advantage of immediately providing the largest supply of rifles possible—a rifle which has served England satisfactorily during three years of actual warfare."

There was very little military support of the position of these two Senators that was ever brought to my notice. I knew of but one officer, General Leonard Wood, then commanding the Department of the East, who held the view that we should have continued the manufacture of the Enfield rifle as it was being made at the time of our entry into the war, should have armed our troops abroad entirely with it, and should have used the British ammunition. He gave these views in an official recommendation to the War Department, and perhaps based them on an exaggerated estimate of the number of rifles required to make wastage good, which had appeared in the newspapers. His recommendation was for supply at the rate of five rifles per man, while the fact was, and subsequent history proved, that one-half a rifle per man was a sufficient allowance for a year's wastage.

It was claimed by the advocates of the exclusive use of the British caliber and the British ammunition that it would diminish by one the number of different kinds of small arms ammunition in use by the Allies, by avoiding our introduction of a new type, and would place us in a position to draw upon the British supply in case our own should be inter-

rupted. But before the conclusion was reached that we should modify the Enfield rifle, it had already been decided that our troops were to operate with the French, and not with the British; and, therefore, the ability to draw upon the British ammunition supply became of less importance. Besides, the small arms ammunition constituted such a minor proportion of the supplies which had to be transported across the ocean that interruption of transportation would have made itself felt in other matters long before it would reach the small arms ammunition. For example, the rifle ammunition supply would not amount to a quarter of a pound per day for each man, while his food supply, alone, would, at the very least, be four pounds per day, that is, sixteen times as great. The French, with whom we were to and did operate, made no point of our lack of interchangeable rifle ammunition with their troops. No tonnage would have been saved by our use of British ammunition, since the materials for manufacturing the ammunition would, in any case, have had to come from this side. As a matter of fact, the few divisions of our troops which did for a time operate with the British were supplied during the interval with British rifles and ammunition.

But great stress has been laid upon the earlier equipment of our troops with rifles which would have resulted from adoption, without change, of the Enfield. This is based upon the assumption that the factories would then have been able to go right ahead turning out several thousand per day,

from the time when they should have finished their British orders. The testimony of the manufacturers themselves was not quite to this effect, however. Mr. Charles H. Schlacks, the General Manager of the largest of the three factories, that at Eddystone, Pennsylvania, testified before the Committee, in December, 1917, as follows:

"*The Chairman*—In your opinion, was the progress of manufacture delayed any by the adoption of the new model gun?"

"*Mr. Schlacks*—Very slightly, Mr. Chairman, if any, and that is certainly wiped out by the fact that the material manufacturers have not kept pace with us."

But there is probably no doubt that we could have secured from the British Government a large number of the Enfield rifles which had already been manufactured for their service, and therefore we can admit that we should have had a somewhat earlier supply for all our troops if we had accepted the rifle as it was. This promptness, however, would have been accompanied by very grave disadvantages. We would have had three makes of rifle in use, of unstandardized manufacture, and with non-interchangeable parts. A soldier in the field, therefore, losing or breaking a part of his rifle, could not make use of a similar part from another gun, and his rifle would thus have been made completely unserviceable. One of the manufacturers was permitted to go ahead with his manufacture before he had attained the finally settled degree of interchangeability, under instructions to attain that de-

gree gradually. This brought from the Expeditionary Force in France the following: "The matter of spare parts and maintenance in our present situation is serious and must not be complicated by the addition of any distinctions in manufacture." The manufacturers, themselves, were all favorable to the change. Mr. S. M. Vauclain, a member of the Advisory Committee of the Council of National Defence, who built the Eddystone rifle factory, and was one of the most experienced business men connected with the manufacture of rifles for the Allied governments, testified as follows before the Senate Military Committee:

"*Mr. Vauclain*—I consider that the Ordnance Department was very wise in taking the time to perfect this rifle. I think it is the finest rifle made today. I think it is even a better rifle than the Springfield rifle, as it is now made. I might not get everybody to agree with me on that, but there is a longer distance between the sights, and it is a very accurately constructed rifle and should give no trouble in the field.

"There is a great objection to using the rim cartridge in the field, on account of jamming when you are working the shot in the rifle. These rifles now have rimless cartridges, the same as used by the Springfield rifle, interchangeable ammunition, absolutely no possibility of jamming in service. Their interchangeability is such that when we were putting English rifles together, if a man put twenty rifles a day together, we thought he had done a good days' work. About ten days ago one of our fitters

put 128 of these rifles together, and 97 per cent of them targeted first shot. If this rifle was not of perfect design and perfectly made as to tolerance, it would be impossible for anybody to put 128 rifles together in ten hours out of the miscellaneous heap of parts; so that I am satisfied that the rifles are an absolutely interchangeable piece of work. The other rifle makers are coming along in good shape. The Government plants are also turning out an increased number of rifles. I do not see anything to worry about rifles." (Hearings, page 360.)

Later experience and wider examination showed the comparative figures of assembly of rifles to be even more striking than as stated by Mr. Vauclain. The best record in the three factories before our entry into the war was the assembly of fifty Enfield rifles in a day by one man, but of the altered and standardized rifle, as it was made for us, the best record became 280 rifles a day, while the average record after the work got well going was 250 rifles a day. The influence of this acceleration of manufacture, both upon the supply and upon the cost, was necessarily very great. The Enfield rifles had cost the British Government over $40 apiece, while the altered rifles cost the United States Government less than $30 apiece. Mr. Vauclain's testimony continued:

"*The Chairman*—There has been some feeling that that change in the Lee-Enfield rifle, to modernize it, created great delay in the delivery of the guns, and there is criticism of the Department in the tardiness with which they have produced the

larger ordnance. Do you feel that there is ground for the criticism?"

"*Mr. Vauclain*—I do not feel there is. If anything, there is ground for commendation for the manner in which the officers in the Ordnance Department of the Army and Navy have arisen to this situation. It is a tremendous task. It is only those who have lived with it as I have lived with it, day and night, Sundays included—I have given my entire time to it—who realize what a tremendous proposition it is." (Page 367.)

Mr. Henry S. Kimball, President of the company which was manufacturing the Enfield rifles at Ilion, testified as follows:

"*Mr. Kimball*—There is one point that I think, perhaps, might be brought out for your benefit. The manufacture of English ammunition at the time war was declared in the United States was reduced to a comparatively small figure. The English contract had run out and had been replaced by other contracts. It would have taken nearly as long—I think Mr. Tyler will correct me if it is not correct—to produce English ammunition in quantities as it has taken us to produce American ammunition in quantities, in the combined resources of the cartridge manufacturers of this country. Therefore, it would have been a serious mistake to build for a large production of an inferior ammunition when in comparatively the same time it was possible to build up for a large production of superior ammunition. Therefore, the ammunition feature was a very large part of the consideration of what arms and

what ammunition should be furnished to our troops."

"*The Chairman*—And justified the modification of the rifle?"

"*Mr. Kimball* — Absolutely, in our opinion." (Page 391.)

Mr. J. E. Otterson, Vice-President and General Manager of the Winchester Repeating Arms Company, gave opinions as follows:

"*Mr. Otterson*—From the manufacturers' point of view, and to anyone familiar with the British rifle, it was desirable to change." (Page 406.)

. . . . . .

"On the cartridge manufacturing side, the manufacturers could more readily and easily and expeditiously manufacture the United States cartridge than the British cartridge." (Page 407.)

. . . . . .

"So, coupling the two things together by making the change, you are getting a superior cartridge and getting a rifle that will function better, and your delay was but about thirty days, and there seemed every reason to change the caliber of the rifles." (Page 408.)

Mr. Otterson, while having no doubt as to the desirability of changing the rifle so as to fire the American ammunition, did not feel so well qualified to estimate the relative weight of the high degree of interchangeability required by the Department and the time which was required to secure it. Upon this point he said:

"*Mr. Otterson*—My position as a representative

of the manufacturer at the time was, that while I was not qualified to pass on the necessity for this higher degree of interchangeability, I could say that it would result in delay, and the question was one purely as to whether the exigencies of the situation warranted or permitted delay. (Page 410.)

. . . . . .

"In the manufacturing and technical sense I was opposed to it and did not consider it worth while. I believe, however, that the necessity for it should rest on the judgment of a military man, and not on the judgment of a manufacturer." (Page 422.)

Mr. Otterson had received a military education, being a graduate of the Naval Academy, but he did not care to trust his judgment as to the military value of a high degree of interchangeability in the rifles; differing in this from certain gentlemen who, with very indifferent attention to military subjects in the past, were quite ready with a condemnatory judgment.

It must be remembered that these manufacturers, in testifying in favor of the changes made in the rifle, were testifying to their own financial disadvantage; for it is apparent that the earlier the manufacture and delivery of rifles for the United States should commence, the sooner would their profits begin to come in. Because of rather unfortunate experience with the manufacture of rifles for the British Government, they were greatly in need of profits.

A very distinct disadvantage of the adoption for our service of the British rifle, as it stood, and the

British ammunition, would have been that it would have left us after the war with several million rifles and several hundred million rounds of ammunition on our hands of types which we did not like, and all the plants fitted for the manufacture of this rifle and ammunition.

But even the critics admit that the rifle, as changed, was a much better gun, and the substance of their criticism is that the change was not worth the delay. They do not seem to have appreciated the extent to which the disadvantages would have involved the ammunition and the ammunition supply; but the effect of the delay in rifle supply needs a little examination. As stated above, we had on hand at our entry into the war about 600,000 Springfield rifles. Not all of these were in the United States. Some were in the Philippine Islands and some in Panama; but, since in armies constituted as were those in the European War only about half of the men carry rifles, the number on hand was insufficient for an army of over a million men. We called our men to the colors so fast, however, that in the autumn of 1917 there were infantrymen in the camps and cantonments without rifles; but, in addition to the Springfields, we had on hand some 160,000 Krag-Jorgensen rifles which were perfectly good guns for training, and these, together with the Springfields, gave a supply for training the soldiers, although not enough to supply a rifle for each man. The shortage, however, was rapidly diminished by the coming on of the modified Enfield rifles, whose delivery commenced in August of 1917 and progressed so

fast that the shortage was wiped out in January of 1918.

A great deal was made by the critics of the shortage of rifles in the camps during the early months of mobilization, but it is doubtful whether the matter was as seriously felt in the camps as it was by the critics. The following letter received from the Division Ordnance Officer at one of the National Army cantonments throws some light upon this point:

"O. O. file 354.1/477

DIVISION HEADQUARTERS,
December 15, 1917.

GENERAL WILLIAM CROZIER,
*Washington, D. C.*

*Sir:*

In connection with the Congressional inquiry now in progress, I believe some wrong impressions have been created.

I submit some facts which may be of use to you so far as this camp is concerned. I presume the conditions are the same, or nearly the same, at all the other National Army camps.

1. There was no delay in target practice due to lack of Enfield rifles.

2. Target practice has been in progress for over a month with plenty of Enfield rifles and ammunition available.

3. Machine guns (Colt) were received before troops were ready to use them.

4. Automatic rifles (Lewis and Chauchat) were received before troops were ready to use them.

5. Machine gun target practice is being held every day the weather permits.

6. The supply, at this camp, of all kinds of target practice ammunition for both infantry and light artillery is more than ample.

7. In my opinion it is almost certain that the troops will be equipped and trained long before ships are available to transport them overseas.

8. After articles of equipment leave the factory there is delay in transportation. The average daily run per car of freight is around 40 miles — about twice the rate of good infantry marching. This rate, I believe, is high for peace time, but seems low under present conditions when transportation is supposed to be mobilized for war.

Very respectfully,

. . . . . ."

With regard to the armament of our troops sent abroad, it can be stated that no soldier was delayed in the slightest degree in sailing for Europe by lack of a modern rifle, and that if any were sent over without sufficient training, it was for other reasons than the lack of rifles to train them with. We neither needed nor received any assistance from our Allies in rifle supply, and never at any time suffered from shortage of rifles in the theatre of war, nor from any threat of such shortage. It is a fact that we had on hand upon our entry into the war more than twice as many rifles, of the standard Springfield model, than were needed for all the troops which we had in the theatre of war a full year later. We had manufactured, up to the time of the armistice, 2,500,000 rifles of the two service models which, with the 600,000 which we had on hand at the beginning, were enough for an army of

6,000,000 men, a million more than we were contemplating for the campaign of 1919.

No decision concerning the equipment of our armies for the great struggle was more important than this one in regard to the rifles. It was arrived at in a conference presided over by the Secretary of War, at which there were present the Chief of Staff, the President of the War College, the Commandant of Marines, General Pershing, who had already been designated to command the expeditionary force, and myself, upon whom fell the task of presenting and urging the program. The event showed that there was no matter connected with the prosecution of the war in which our forces were more adequately served than in this most important one of all, and this without any offsetting price, except the evidence exhibited to the people of the previous neglect of proper provision, and the subsequent savage criticism by some of those who might have feared that they would be held responsible.

## VI

### MACHINE GUNS

The late war, so to speak, brought the machine gun into its own. This class of weapon had been developed to a serviceable stage at the time of the Spanish-American War, but neither in that war, nor in the Boer War, nor in the Philippine insurrection, nor in the Pekin Relief Expedition, nor in the Russo-Japanese War, nor in the Balkan Wars had it attracted anything like the attention which has resulted from its use in the World War.

In the matter of the delivery of musketry fire proving ground performance shows the machine gun to be equivalent to twenty or thirty infantrymen, and if its necessary crew be taken as, say, five men, it can be regarded as saving, in uses for which it is appropriate, from three-quarters to four-fifths of the men who would otherwise be necessary to do the same work. It has been employed universally in the defense of positions; either those recently taken in an advance, and in process of "consolidation," or those prepared and held against an expected assault. A prominent use, of the latter class, was by the Germans in rear guard actions, where machine guns scattered along the front, in "nests" or "pill-boxes," that is, in specially concealed or

specially strengthened emplacements, constituted mutually supporting strong points, very difficult to advance against or to get between. In many cases the crews were evidently instructed to fight to the last, with the expectation that they would then fall into the hands of the pursuers, while the main body would get away. The necessity for discouraging this practice undoubtedly led in some cases to refusal to accept the surrender of the crews. As was to be expected, the extensive employment of the weapons brought about a differentiation of function, and the introduction of special designs for special uses. The normal design was used for position holding, where weight was not of importance in comparison with prolonged and continuous fire, while a lighter design was developed for carrying forward with an advancing line, and holding a position gained until it could be more strongly "consolidated." This later type was called, for want of a better name, automatic rifle, leaving the name machine gun for the heavier type, although both types are machine guns and both are automatic rifles. In the automatic rifle a certain degree of endurance is sacrificed to lightness. The Vickers, the heavy Hotchkiss and the heavy Browning, weighing in the neighborhood of 36 pounds each, are examples of machine guns; the Chauchat and the light Browning, weighing 16 to 19 pounds, are automatic rifles; while the Lewis and the Benet-Mercié, or light Hotchkiss, of about 26 pounds weight, are intermediate and not favored for ground use by the French, although so employed by the British. The Germans had appar-

ently realized better than anyone else the value of machine guns in the kind of fighting which they expected to be engaged in, and therefore supplied them to their troops in greater numbers than did the other Powers. We, in common with many other civilized nations, had before the World War such an appreciation of the need for machine guns as was expressed by our establishing an allowance of about four per regiment, with no machine gun organizations outside the regiments, and a supply was then accumulating at the very low rate corresponding to an annual appropriation of about $150,000. The present allowance is at the rate of about 250 per regiment.

An appropriation of the above amount was made in the Army Act of 1912, but before the consideration commenced of a bill for the next year, expressions of dissatisfaction with the rifle with which the service was then principally armed—the Benet-Mercié, otherwise known as the light Hotchkiss—had reached the ears of Congress. This dissatisfaction was, I believe, largely due to lack of proper instruction in the use of this class of weapon, and the belief upon the part of numbers of officers in the service that there was some other machine gun of such simple construction that no great amount of special instruction would be necessary for its use—which was a radical error.

No entirely satisfactory machine gun has yet been developed; that is, we have never had a machine gun that is not subject to stoppage by reason of some kind of malfunction. The Browning gun, as

was anticipated by the Ordnance Department, is a great advance in this respect; but it must be remembered that these weapons are machines, operating with tremendous pressures and tremendous velocity of moving parts, the Benet-Mercié giving out about one horsepower for each pound of its weight —approximately double the output per pound of the Liberty engine—they are, therefore, subject to the weaknesses and infirmities of all machines. They have never reached the simplicity and perfection of construction which would insure their operation in the hands of the soldier with the same certainty that attends that of the ordinary rifle or pistol. Their infirmities have been accepted because of the large effective output which can be had from them when they do work well. Our line officers now understand the intensive and laborious instruction which is necessary to train a soldier in the mechanical manipulation and the tactical use of a machine gun.

The Benet-Mercié automatic machine rifle was adopted for use in the United States Service in 1909, after exhaustive trials by two boards, both of which reported that it was the best and most reliable machine gun which had ever been before the Government. It is still the machine gun of the British Government for the armament of tanks.

The Army Appropriation Act of June, 1913, because of the dissatisfaction above mentioned, instead of making an appropriation for machine guns, authorized the Secretary of War to contract for their manufacture to the extent of $150,000, "if in his opinion it be for the interest of the service."

This legislation reflected doubt in the mind of Congress as to a suitable service machine rifle, and threw upon the Secretary of War a more impressive burden than usual of responsibility for the type of machine rifle for which contracts might be made. Before urging upon the Secretary of War, therefore, the exercise of the authority which had, with some warning, been conferred upon him, the Ordnance Department joined in arrangements for a competitive test of automatic machine rifles, which was begun in the autumn of 1913 and continued in the spring of 1914; the guns now most prominent among those which were tested being the Benet-Mercié, the Vickers, and the Lewis, which last gun figured extensively in the expressions of dissatisfaction which became common at the lack of sufficient equipment of machine guns upon our entry into war, the point being urged in behalf of this gun that there was prejudice against it in the Ordnance Department, and that the Government was, therefore, unwisely, if not wrongfully, deprived of a supply which everybody afterward would have been very glad to have. It is appropriate, therefore, to set forth especially the experience of the United States Government with the Lewis gun.

The first offer of the Lewis gun to the Government of which there is any record, or of which I have any personal knowledge, was made to the Board of Ordnance and Fortification in a letter dated May 2, 1912, from the Automatic Arms Company, which controls the patent, by the attorney for the company, Mr. R. M. Calfee (proceedings of the

Board of Ordnance and Fortifications, dated May 2, 1912, signed by General Wood).

The Board considered this letter on June 6th, and replied that it did not care to accept certain limitations upon the test which had been imposed in the letter offering the gun (proceedings of the Board of Ordnance and Fortification, dated June 6, 1912; signed by General Crozier).

On July 2, 1912, the Board considered a letter, dated July 1st, from the Automatic Arms Company, requesting reconsideration of the Board's action in regard to the test of the gun, and stated in its reply "the Automatic Arms Company is informed that, after careful consideration of their letter, the board is of the opinion that the usual procedure should be followed, namely, the gun must be submitted to the test prescribed by the Ordnance Department. During this test the representatives of the company will be permitted to be present, and, preliminary to the test, to give such exhibition of the performance of the gun as they may see fit, in the presence of the representative of the Ordnance Department charged with technical examination of the gun. After this demonstration is completed the gun will then be submitted to such tests as the Ordnance Department may deem necessary. Ammunition for such tests will be furnished by the Government.

"The parties representing the gun may have the privilege of declining to subject it to any portion of the test which may be proposed to which they may not wish to have it subjected at the time, but in re-

specting their wishes in this regard the report will, of course, state the facts.

"In the course of the complete test the gun will have the kind of field test which they desire, and copies of all reports in regard to the test will be furnished the company." (Proceedings of the Board of Ordnance and Fortification, dated July 2, 1912; signed by General Wood.)

The matter rested at this stage until March 5, 1913, when the Automatic Arms Company again offered a Lewis machine gun for test, pursuant to which a test was ordered on the recommendation of the Board of Ordnance and Fortification. (Proceedings of the Board of Ordnance and Fortification, dated March 6, 1913; signed by General Wood.) A board of officers was, pursuant to the recommendation of the Board of Ordnance and Fortification, appointed by the War Department, to make a competitive test of all the automatic machine guns which should be submitted to it, the membership of the board consisting of Colonel Ernest Hinds, U. S. A.; Major W. G. Penfield, Ordnance Department; Captain W. R. Smedberg, Jr., Cavalry; Captain Frank S. Bowen, Infantry, and Lieutenant Austin N. Hardee, Infantry.

The board met at the Springfield Armory in September, and tested seven different models of automatic machine guns. The Lewis gun submitted used American ammunition, but had been manufactured in England. At this test all of the competing guns were eliminated except the Benet-Mercié and the Vickers, and of these two a field test was made in

the spring of 1914, which resulted in the selection of the Vickers gun. Of the three guns that were the most prominent, the report of the board states that in the endurance test there were with the Lewis gun 206 jams and malfunctions; with the Vickers gun, 23; and with the Benet-Mercié, 59; the Lewis gun had 35 broken parts, while there were none for the Vickers and 7 for the Benet-Mercié; and the Lewis gun had 15 parts not broken but requiring replacement, as against none for the Vickers gun and none for the Benet-Mercié. The board reported that, "The Lewis automatic machine rifle, as at present designed, is not superior to the service automatic machine rifle (Benet-Mercié) on account of the failure to maintain continuous fire, the large number of parts which were broken, and the large number of jams, many of the latter being reduced only after much difficulty and considerable time." The report also stated that "The board is of the opinion that, with the exception of the Vickers gun, none of the other guns submitted showed sufficiently marked superiority for the military service, in comparison with the service automatic machine rifle (Benet-Mercié) to warrant further consideration of them in a field test." The instructions of the board had been to ascertain whether any gun had sufficient superiority over the Benet-Mercié to warrant its adoption or further test.

During the course of the test the Army bill of 1914 was passed, and as no conclusion had been reached, the bill made no appropriation for machine guns. At the time of the passage of the bill of the

following year, 1915, the Vickers gun had been adopted as the approved type, and that bill therefore made an appropriation of $150,000 for machine rifles, and in addition reappropriated the unexpended balance of $44,421.00, which had been left over from preceding appropriations at the time when the question of substituting a new machine rifle for the Benet-Mercié was taken up. Funds thus made available were used in making a contract for Vickers guns, which had been unanimously recommended by the testing board for adoption in replacement of the Benet-Mercié.

It is apparent that at this stage, the middle of the year 1915, there would have been no justification for expending the slender means at the disposal of the Department for procuring Lewis guns, in the face of the declaration of the board that they were inferior both to the Benet-Mercié gun already in service, and to the Vickers gun which had been recommended for adoption.

No Lewis gun was presented for a second test, after the first one in 1913, until April of 1916. This was understandable in view of the outbreak of the war in Europe, where the guns were being made, but in the latter part of 1915 their manufacture in this country for the forces of the British Empire was commenced by the Savage Arms Company of Utica, N. Y., and the Ordnance Department then took the initiative in an effort to secure a second gun for test. In reply to request on the Savage Arms Company for such a gun, its Vice-President,

Mr. W. G. Greene, wrote on September 30, 1915, as follows:

"At the present time we are not able to furnish your Department with a gun, having only two ourselves, both of which are in constant use at the factory, one as a manufacturing model, and the other as an experimental model. These two guns were both manufactured by the Birmingham Small Arms Plant. We will gladly demonstrate one of these guns if you care to send an officer." (O. O. file 472.5/55.)

Under date of December 28, 1915, after another inquiry, Mr. Greene wrote:

"We acknowledge your letter of the 23d, in which you ask if we can furnish you with one Savage-Lewis machine gun. We are, of course, most anxious to furnish the Department not only with one Savage-Lewis gun, but with a considerable quantity, but at the present moment our output is all engaged, deliveries just now being due the Department of Militia and Defense at Ottawa, and we do not feel at liberty to divert even one gun from the contract deliveries." (O. O. file 472.5/55.)

In response to another effort of the Department, Mr. A. A. Borie, president of the Savage Arms Company, wrote under date of January 27, 1916:

"I regret to inform you that such a sale at the present time is impossible on account of other commitments made by this company. We trust, however, in the near future to be able to deliver a Lewis machine gun to the Department for the purpose of test by the Department, and will notify you in re-

gard to this as soon as possible." (O. O. file 472.5/74.)

A test of the Lewis gun was finally held at the Springfield Armory in April of 1916. Two guns were tested, one using American and the other English ammunition. In regard to the gun using American, or service ammunition, the report of the board states:

"The service gun was withdrawn at this time by the Savage Arms Company (Mr. Borie and Mr. Wright, Colonel Dooley, Mr. Nelson and Mr. Renew being present), who stated that, as the gun was in an experimental stage, and as it was giving trouble both in feeding and in rupturing cartridges, which trouble it was thought would be overcome in a subsequent gun, they considered it useless to continue the test." (O. O. file 472.5/110.)

This statement of the company in April, 1916, that the gun for American ammunition was in an experimental stage at that time ought to dispose of the claim that it was then, or had been at any time previously, ready for purchase for the use of the American Army. The claim as to its ability to fire American ammunition was made by Col. Lewis in his testimony before the Senate Military Committee, on December 22, 1917, in the following language: "Not only does the Lewis gun fire ammunition, American ammunition, successfully, but the Chief of Ordnance fired it many times himself in the tests in the presence of the members of the Board of Ordnance and Fortifications. That was in 1912. There has been no question about firing

American ammunition. It was made to fire it. It fires it better than any other kind of ammunition. I have now perfected it so that it will fire eight different kinds of ammunition of as many different countries.

"I want, therefore, first of all to settle the question of whether it will use or shoot American ammunition. Witness after witness has come before your committee and deliberately misrepresented the facts in the case. It is done intentionally. I cannot escape the conclusion that the misrepresentation is intentional, because it is so oft repeated." (Hearings: Part 2; page 701.)

The board was composed of Captain W. R. Smedberg, Jr., of the Cavalry; Captain G. H. Stewart, of the Ordnance Department, and First Lieutenant Thomas W. Brown, of the Infantry. The board was created by a War Department Order, and submitted its report to the Adjutant-General. It was not a board of the Ordnance Department, nor were any of the boards which dealt with the Lewis gun. They were all War Department boards, which contained only one Ordnance officer, and were not subject to the jurisdiction of the Chief of Ordnance.

In regard to the gun using British ammunition, the Board reported as follows:

"Considering the performance of the Lewis gun in the test reported herein, and comparing that performance with the performance of the Vickers gun (Automatic Machine Gun, Model of 1915) and of the Springfield gun (Automatic Machine Rifle, caliber

.30, model of 1919)* in the test conducted by the board convened by Special Orders No. 191, War Department, August 16, 1913, the board finds that the Lewis gun in its present state of development is not equal or superior to either of the above-mentioned guns. The Lewis gun is not as reliable or as dependable as are the other guns mentioned. The following table shows in summary the data upon which this opinion is based:

ENDURANCE TEST—15,000 ROUNDS

| | Lewis | Springfield | Vickers |
|---|---|---|---|
| Time of firing, excluding cooling and repairing | 2 hrs. 3 min. | 2 hrs. 27 min. | 1 hr. 24 min. |
| Number of jams and malfunctions | 314 | 59 | 23 |
| Number of broken parts. | 8 | 7 | 0 |
| Number of parts not broken but replaced.. | 5 | 0 | 0 |

"The Lewis gun, on the other hand, is lighter, simpler and has fewer number of parts than the other guns mentioned; and, in the opinion of the board, the question as to whether or not it can be developed to a satisfactory degree of reliability and dependability is an open one.

"The board finds, therefore, that the results of the present test were not such as to justify the purchase of four Lewis guns chambered for the service ammunition for further test at this time, but in view of the desirable features of the gun, the board recommends that if the Savage Arms Company under-

* Otherwise known as the Benet-Mercié.

take to develop a gun for the service ammunition a further test be made, upon their request, after the development shall have been carried to a satisfactory stage." (O. O. file 472.5/110.)

It is thus seen that at this second test the board stated that the Lewis gun, even using British ammunition, was not as good as had been shown at the test of 1913 to be both the Benet-Mercié, which had been superseded, and the Vickers, which had been adopted; and that the gun using American ammunition had not been able to get through the test at all. There would, therefore, have been no justification at this time for the investment of funds in Lewis guns, with two better types within the knowledge of the Department, even if there had been funds available for the purpose, which there were not. In regard to this test of the month of April, the President of the Savage Arms Company, which presented the Lewis guns, wrote the following letter, before the conclusion of the board was announced:

EXECUTIVE OFFICE, SAVAGE ARMS CO.,
50 Church Street, New York, U. S. A.
April 26, 1916.

A. E. BORIE, *Pres.*

GENERAL WILLIAM H. CROZIER, *the Chief of Ordnance, War Department,*
*Washington, D. C.*

*Sir:*

This company wishes to express its appreciation to the Ordnance Department for the courtesies extended recently by the board appointed to inspect the operation of the Lewis machine gun. The com-

pany feels that the investigation has been entirely impartial and regards the board as one very capable of judging the value of the investigation to the Ordnance Department.

We also appreciate the courtesy shown us by Colonel Peirce and his assistants.

Respectfully,

SAVAGE ARMS COMPANY,

(O.O. 472.5/124) *A. E. Borie, President.*

The next experience of the Ordnance Department with Lewis guns was in the summer of the same year, 1916, when, pursuant to my recommendation, 353 of these guns were purchased, for use on the Mexican border, from the Savage Arms Company, where they happened to be available from a number which had been made for the Canadian Government. The guns used British ammunition, a supply of which had to be purchased for them, and were the only machine guns which could be had. As funds were not available for the purchase of these guns, a deficit had to be created for the purpose; that is, they were purchased without authority of law. Unusual care was taken in establishing schools and furnishing experts to give instruction in the use of the guns before the soldiers were allowed to have them. Various reports were received as to their performance. The following is from an officer who was an instructor in one of the schools. It inclosed a letter which had been written to the editor of the *Army and Navy Journal,* of New York, but which I did not forward to that paper. This inclosure I also present:

Camp Cotton,
El Paso, Texas, December 11, 1916.

General William Crozier, *Chief of Ordnance, U. S. A.,*
*Washington, D. C.*

*My Dear General:*

From the privilege extended me while you were observing the machine gun instruction at Fort Bliss, Texas, some time since, I am addressing you in regard to the selection of the types of machine guns to be adopted and secured for our service.

The enclosed letter is written not in the nature of an expression of which type of automatic rifle is the better, only as the result of the comparison of the two as we have found them in our daily work.

This letter was addressed to the *Army and Navy Journal* requesting that it be published with no desire to get ourselves before the public, but solely through interest in this very important subject and with the hope that it may enlighten some who have not had the opportunity to witness such a comparison and test in field work.

It is requested that you have this article published or used in any way that you may deem advisable and best, or advise us, as we will not forward a copy to the *Army and Navy Journal* until advised by you.

We are intensely interested in the subject of machine guns and only wish that we had a chance to learn more of and work more with the various types of automatic rifles and machine guns, than can be had in our very interesting work here.

With kindest personal regards,

Very truly yours,
T. N. Gimperling,
*Captain 34th Infantry.*

El Paso, Texas, December 9, 1916.
Note: Not sent (Dec. 18, 1916).

*To the Editor of the Army and Navy Journal, New York, N. Y.*

*Sir:*

In view of the present controversy over the selection of automatic machine rifle to be adopted and bought for the army; as the machine gun board is now in session and as various articles are appearing in your columns on this subject, we request that you publish the following data, based on facts obtained from over three months of daily instruction in the handling and firing of these guns and in problems simulating active service conditions and requirements as nearly as can be obtained anywhere.

The two types of automatic machine rifles used were the Benet-Mercié and the Lewis gun. Factory experts of each type were present to keep their guns in the best possible condition.

The machine gun company of the 33rd Michigan Infantry, 95 per cent of whose personnel are general mechanical engineers and expert mechanics, is equipped with both the Benet-Mercié and the Lewis automatic rifles; this company had two Benet and four Lewis guns. The organization has received thorough instruction in the operation of both types of guns from experts direct from the Savage Arms Company (Lewis gun) and from the Springfield Armory (Benet-Mercié gun) and there is no reason to believe other than that these men are fully competent to assist in giving both types of gun a fair and impartial test.

We therefore believe we are safe in asserting, as both guns were in use side by side, that the compara-

tive merits of these two types of guns, as efficient weapons, could be fairly judged.

This company has fired approximately forty thousand rounds of service ammunition with the Benet guns and approximately twenty-five thousand rounds of British .303 with the Lewis guns. These two Benet-Mercié guns have been in use for a period of about six years and have been in use at the School of Instruction at Sparta, Wisconsin. During this time they were in use by the machine gun companies of the Michigan National Guard for a period of three years; while the Lewis guns were issued to them in August of this year and were, therefore, new, as they were part of the Canadian shipment taken over by the U. S. Government from the Savage Arms Company.

In every case in which these guns have been fired side by side, the Benet-Mercié gun has proven its superiority. Many examples could be cited in support of this, one of which is as follows:

"Firing was maintained for one and one-half minutes for all six guns, with these results: one Benet gun fired 348 rounds with one jam; another fired 364 rounds with two jams. One Lewis gun fired 117 rounds with four jams; a second fired 87 shots with two jams; a third fired 44 rounds with five jams; and a fourth fired 9 rounds with one jam, which put this gun out of action."

This is but a fair example of the general results obtained by this company in the operation of the two types of gun.

The company has obtained as many as 546 rounds from one Benet gun in continuous firing without a jam. With the Lewis gun the best that they have

obtained is the 117 rounds with two jams in one and one-half minutes, cited above.

It is our opinion that the parts of the Lewis gun are not properly finished and that they are made of a rather poor grade of material. The gun has a number of steel stamped parts, improperly heat-treated, which cause jams and a consequent inefficiency in the gun. As an example, the magazine is made of a very thin, flimsy steel stamping, toggled up with a combination of soft aluminum core and metal strips which are riveted on. This causes the magazine to be very vibrant and susceptible to the strain of feed pawl functioning. The ejector is made of a thin steel stamping, improperly heat-treated, and very often it bends, nearly always batters on the end, through bolt action, in the course of eighty to one hundred and fifty rounds. The feed pawls, stop pawls and rebound pawls seem to be made of a poor grade of steel. The gas cylinder is made of a twenty gauge mill run steel, which has been found to be full of scale pits and imperfections. We believe that the gun, as at present constructed, could be made in lots of a thousand or more, at approximately fifty or fifty-five dollars per gun, for material and labor. It is now sold to the Government for a thousand dollars.

From the standpoint of mechanics, the Benet-Mercié gun is a masterpiece, inasmuch as the parts are finely finished and are made of excellent material and are properly treated where this is essential. The price at which the Government issues this gun is approximately $412.00, which, it is believed, would net, to a private manufacturing concern, but a fair profit over the cost of production.

We are wedded to no type of gun, but are presenting these facts in the interest of the service.

T. N. Gimperling,
*Captain, 34th U. S. Infantry,*
*Machine Gun Director, 11th Prov. Div.*

David O. Byars,
*1st Lieut. 34th U. S. Infantry,*
*On duty with Machine Gun Company.*

Arthur C. Crossman,
*Captain, 33d Michigan Infantry, Comdg. Machine Gun Company,*
*Efficiency Engineer, Studebaker Corp.*

Maxwell H. Spreen,
*1st Sergt. Mach. Gun Co., 33d Mich. Inf.,*
*Asst. Chief Engr. Chevrolet Motor Car Co.*

The School of Musketry submitted a report, January 7, 1917 (O.O. 472.5112/129), on efficiency of machine guns, showing extensive firings and careful consideration. The report stated as follows:

"Thirteen Lewis guns were used in the firing. The guns were new. Except for some possible test firing not a shot had been fired from any of them prior to their use by this class. When they were received at the school it was found that several of the parts did not fit properly. This was true in particular of the joints between the barrel groups and the receiver groups. The other cases of misfit were due largely to poor workmanship and lack of finish.

"When the firing of the guns began there was very little trouble with them that could not be accounted

for by the fact that the personnel of the class was inexperienced and that about 3 per cent of the ammunition used was found to be faulty. After about 2,000 rounds had been fired from each gun, jams began to occur which were due to causes other than untrained personnel and defective ammunition.

"By far the greater portion of jams due to defective mechanism were caused by the wear of the feed operating arms and stud, the bending of the cartridge guide, and the faulty construction and bending of the magazines; and of these about one-half were due to faulty magazines.

"The total number of rounds fired from these 13 guns was 166,180. The maximum number fired from any one gun during any particular day was 2,992.

"The following list shows the parts of these guns that were broken, damaged or lost during the course of the firing above noted:

| | | |
|---|---|---|
| Broken..... | 57, | including 13 bore cleaning rods |
| Worn ..... | 74, | " 57 magazines. |
| Lost .....162 | | |
| Total..... 293 | | |

"In their present condition these guns cannot be depended upon to fire a single magazine without malfunctions. Whether or not they would operate with good magazines and with serviceable feed operating arms and studs remains to be seen when they are tested in this manner. At the present writing the spare parts with which to make such tests are not on hand.

"The Lewis gun in its present state of development is not believed to be a satisfactory weapon for issue to our service as an automatic rifle or 'first line gun.'"

. . . . . .

"The Lewis gun, while it is not a dependable weapon at present, is believed to possess great possibilities. Its lightness, the simplicity of its mechanism, the efficiency of its cooling system, and the ease with which men learn to use it (when it is new and working well), all tend to indicate that *if it can be made dependable,* it will be an excellent first line gun."

This report was signed by Colonel R. M. Blatchford, Infantry, afterward a major-general in the National Army.

A number of reports were submitted by organization commanders in the Southern Department in regard to these guns, of which the general purport is exhibited in the following letter from the Department Commander:

SOUTHERN DEPARTMENT,
Fort Sam Houston, Texas,
March 1, 1917.

From: Commanding General, Southern Department.
To: The Adjutant General of the Army.
Subject: Reports covering tests made of the Lewis machine gun and Benet-Mercié machine gun.

1. Herewith are the reports of the commanding officers of the machine gun companies of the 19th Infantry and the 37th Infantry covering compara-

tive tests made of the Lewis machine gun and the Benet-Mercié machine gun.

2. These reports are forwarded in connection with the 9th indorsement on A.G.O. file 2436783.

3. These reports are further evidence that in the extensive tests made in the Southern Department, the Lewis machine gun has failed to demonstrate its superiority over the Benet-Mercié gun in so far as its suitability for use with the machine gun organization of infantry and cavalry regiments is concerned.

(signed) JOHN J. PERSHING,
*Major General, Commanding.*

In the meantime, in July, 1916, the same War Department board which had tested the Lewis gun in April tested a Colt gun submitted by the Colt Patent Fire Arms Manufacturing Company, and reported as follows:

"Considering the performance of the Colt gun in this test as compared with the performance of the Lewis gun chambered for British Mark VII ammunition, reported on by this board under date of April 25, 1916, the board finds that the Colt gun as submitted is superior to the Lewis gun for general service use. The Colt gun showed considerably greater reliability than the Lewis gun. The board finds, however, that for the particular case of use in aeroplanes, the Lighter Lewis gun, with its self-contained magazine, is superior to the Colt gun, in spite of the former's greater liability to malfunction."

During all this time appropriations for the purchase of machine guns had been most meager, but the Army Appropriation Act approved August 29, 1916, carried a large appropriation of $12,000,000,

for these guns, and its judicious expenditure became a matter of great moment.

This was the first appropriation of size sufficient to be of any significance in procuring a supply of machine guns which was ever made. About ten days before the date of the Appropriation Act, and when it was evident that the inclusion, upon its passage, of the sum for machine guns was assured, I submitted to the Secretary of War a recommendation as to the disposition which should be made of the funds. The recommendation was made in the light of a possible emergency calling for a hasty supply of more machine guns for use on the Mexican border, and also in reply to a recommendation which had come from General Wood that the Benet-Mercié guns in the service be discarded and replaced by Lewis guns. My recommendation is contained in the following memorandum:

WAR DEPARTMENT,
Office of the Chief of Ordnance,
Washington, August 18, 1916.

Memorandum for the Secretary of War.
Subject: Purchase of machine guns.

1. I recommend that the following action be taken upon the passage of the pending Army appropriation bill:

(a) That for emergency requirements in the immediate future either Colt guns or Lewis guns, using American ammunition, be purchased. With this authorization I shall probably purchase Colt guns, in accordance with the recommendations of the testing board as to their superiority over the Lewis guns for general service, unless a particularly favorable reply shall be received to an inquiry now

pending as to possible terms of purchase of Lewis guns.

(b) That orders be immediately placed for Vickers guns, to the extent of one-half of the funds available.

(c) That orders for machine guns, of a type to be determined at the time of ordering, to the extent of the remaining funds available be placed not later than November 1st next.

(d) That a test for the determination of its suitability for purchase and use in the service be made of any gun presented in sufficient time for the conclusion and consideration of the test before November 1st next.

(e) That thereafter the usual practice be followed of testing any machine gun which may be presented for test, with reference to its suitability for purchase for use in the service from any sums made available by future appropriations.

(f) That decision be definitely made not to replace the Benet-Mercié guns now in the service with Lewis guns, or with those of any other type, unless further developments shall indicate the desirability of a review of this decision.

(g) That announcement of the above be made in such manner as to reach all interested parties.

2. These recommendations are made in the light of the following information: The total number of automatic machine guns required, in accordance with the approved program, is 12,000, of which the following are on hand or under manufacture:

| | |
|---|---|
| Maxim | 287 |
| Benet-Mercié | 665 |
| Lewis | 353 |
| Vickers | 125 |
| Total | 1,430 |

Of these the Maxims and the Vickers are of a heavy type, and the Benet-Mercié and the Lewis are of a light type. Some guns on hand, of older models, are not counted. The funds expected to be available are about $12,000,000, which are sufficient to purchase about 4,000 guns, with necessary accessories, of the most expensive type. Additional funds ought to be available not later than March 4th next, to be appropriated at the next session of Congress.

3. Before the next session of Congress the Ordnance Department will bring to the attention of the War Department the necessity for arriving at a conclusion as to whether a heavy and a light type of automatic machine gun are needed in the service, and if so, their relative numbers. Such a conclusion is not necessary with reference to the program above recommended, for the reason that the program will leave the supply such as to render compliance possible with any probable conclusion which may be reached.

WILLIAM CROZIER,
*Brigadier General, Chief of Ordnance, United States Army.*

The tests referred to under (d) and (e) of the memorandum were designed to afford opportunity for a perfected Lewis gun, a Browning gun, or any other, to establish its suitability for procurement.

The Secretary of War did not follow my recommendations, but, on September 28, 1916, appointed a board with the following instructions:

"The board will consider and make recommendations as to whether a single type or more than one type of machine rifle, using small arms ammunition, is needed for the service, and the type or types which

should be procured; and if more than one type, the proportion of the different types.

"In making its recommendations the board will take into consideration the present supply of machine rifles of the various types; all reports of tests of machine rifles which may be believed to be serviceable in reaching a conclusion; the amount of funds now available for the procurement of machine rifles; the appropriations necessary to be made in order to complete the supply at an appropriate rate; and any records of the War Department, or of any branch of it, which it may desire to consult. If the board shall find that tests previously made are insufficient to enable it to reach a conclusion it will make recommendation as to further tests which ought to be made, their character, time and place.

"The board will recommend the type of gun which should be procured in case of an emergency requiring an earlier supply in possibly limited quantity than can be had of the gun which it may consider as eventually the most suitable, if there be any of which earlier delivery may be possible; and whether contract should be entered into for a considerable supply of a gun of known type in advance of any test which it may conclude to be called for, and if so, to what extent.

"The board will submit its report to the Adjutant General of the Army."

The membership of the board was selected with great care, in order to insure its expert and judicial character, and was as follows: Brigadier General Francis H. French, Colonel Joseph T. Dickman, 2d

Cavalry; Colonel Tracy C. Dickson, U. S. Army, retired; Lieutenant Colonel Henry D. Todd, Jr., Coast Artillery Corps; Captain Robert H. Willis, Jr., Signal Corps; Lieutenant Steven C. Rowan, U. S. Navy; Captain Edward B. Cole, U. S. Marine Corps; Mr. Bascom Little, Cleveland, Ohio, and Mr. B. M. Hanson, Hartford, Conn. Their instructions required them in effect to cover the whole subject of the supply of machine guns, including types. Mr. Hanson, an expert mechanical engineer, had at that time no connection with any machine gun interest, although he subsequently became a member of the staff of the Colt Patent Fire Arms Manufacturing Company.

On October 24, 1916, the board submitted a preliminary report in which it recommended among other things—

"That tests heretofore made show that the Vickers machine rifle fulfills to a high degree the requirements of the military service for a machine rifle of the heavier type.

"That previous tests and other information obtained by the board do not warrant its recommending at this time a rifle of the light type.

"That available funds be used for immediate procurement of 4,600 Vickers machine rifles and 960 pack outfits for the same.

"That further and competitive tests of machine rifles be conducted by the board at the Springfield Armory, Springfield, Mass., tests to begin May 1, 1917."

This report was approved by the Secretary of

War on October 27, 1916, but immediate action of the Ordnance Department in regard to procuring 4,600 Vickers machine guns was suspended by the War Department upon a protest by Mr. R. M. Calfee, of the Automatic Arms Company, representing the Lewis gun; and the machine gun board was reconvened. It submitted an additional report dated December 4, 1916, which confirmed its previous recommendations, with a statement that if it was desired to retain a certain amount of the funds then on hand for the purpose of insuring procurement of light machine guns after a test in May, such action could be had by reducing the number of guns which had been allowed for wastage.

The final conclusion reached by the War Department (contained in O. O. file 472.5-112/117) was that 4,000 Vickers machine guns with 960 pack outfits therefor, should be immediately procured; that $1,560,000 should be held in reserve for the purchase of guns of such other types than the Vickers as the Secretary of War might decide upon after test, or for such other use as might be decided by the Secretary.

The Adjutant General's Office on December 15, 1916, transmitted to the Ordnance Office final authority to proceed with the procurement of Vickers guns. On the following day, December 16th, the order was placed and the contract executed and signed (A. G. O. file 2482640-E). The resort to a board delayed action until about the middle of December, or nearly four months, but the method used was through extreme solicitude to give every considera-

tion to the Lewis gun, and prevent any reasonable ground for dissatisfaction at its treatment.

Such was the situation at the time when the imminence of war with Germany became apparent. All of the funds at the disposal of the Ordnance Department, except about $1,500,000, had, by authority of the War Department, been utilized in placing a contract for machine guns of the type which had repeatedly been declared, by the most expert agencies which the War Department could create, to be the best in existence, and which had received emphatic and continuing indorsement in the European War. The remaining funds had been held for utilization in accordance with knowledge which might subsequently be acquired. If, up to this time, any considerable order had been placed for Lewis guns using American ammunition, the action would have been taken in the face of the failure of these guns ever to perform satisfactorily at a test with American ammunition; and against the recommendation of every body of advisers upon which the War Department had called for counsel.

In view of the fact that Lewis guns were at this time rendering such service to the British forces as to justify their continuance as the standard machine gun of the light type for their army, the question arises as to why good Lewis guns were being made in England, and at the same time poor Lewis guns were being made in this country and urged upon the Government with great insistence. I do not undertake to answer this question, but it must be remembered that no Lewis gun as made in

England for the British service had ever been available for the United States, even for test.

On April 9, 1917, immediately after the outbreak of the war, I recommended that, as soon as funds should become available, which was expected to be almost immediately, orders should be given for 4,000 more Vickers guns, and for 2,500 Colt guns. The latter were recommended because it was practicable to secure them promptly, and, although not of an adopted type, their immediate availability called for their purchase as an additional number to those covered by the machine gun program. The Lewis gun had, through the winter and early spring, in the meantime been brought to a state of practicability for use with American ammunition, as shown by a test held under the auspices of the Navy Department, and witnessed by one of my officers, over fifteen important changes having been made in it; and, therefore, at the same time, and in anticipation of the test to be held in the month of May, I recommended that the $1,500,000 at the disposal of the Department be invested in an order for Lewis guns, and that further authority to procure up to 5,000 of these guns be given, for utilization as soon as additional funds should become available. The funds thus already available were utilized in placing an order for 1,300 Lewis guns, which was done on April 12th. The 2,500 Colt guns were ordered on June 2d, using funds which were made available by the Army Appropriation Act of May 12, 1917. From the funds appropriated in the same Act, the Ordnance Department also ordered, on June 12th,

4,400 Lewis guns, at the same time informing the Savage Arms Company that additional orders might be expected. Two thousand additional were ordered on June 18th, three days after the passage of the first war appropriation measure, the appropriation Act of May 12th having been small, this act being the deferred Army appropriation bill which failed at the session before.

At the tests which were held in the month of May by the War Department machine gun board, in accordance with its program, the Lewis gun's performance was highly satisfactory. In regard to it the board stated:

"The mechanism of this gun has been under continual development since it was last tested by the War Department. . . . The Lewis machine rifle, caliber .30, fully established its character as a first-class machine gun. Many improvements have been made in this gun since it was last tested, which justify the delay of the War Department in according complete recognition to this weapon."

Following this report orders for Lewis guns were given from time to time as funds became available, up to the number of about 42,000, ordered by the autumn of 1917, and subsequently increased to 86,700, to produce which the company was first requested to increase its plant capacity to 2,000 per month, and afterwards to 3,750 per month, the arrangement providing for an expenditure of $1,000,000 in the expansion of facilities, to be taken care of properly in the price of the guns.

This history shows that as soon as the Lewis gun

was developed to the point of ability to properly perform with American ammunition, large orders were given for it, and the manufacturers were encouraged to expand their plants, the commencement of this action anticipating the report of the War Department board.

In the meantime, while the consideration of the relative merits of the Benet-Mercié, Vickers and Lewis guns was going on, Mr. John Browning, of Utah, working in connection with the Colt Patent Fire Arms Co., of Hartford, Conn., had undertaken the design of a machine gun, and had informed the Ordnance Department of his efforts. One or two exhibitions of the gun had been made, which showed promising performance of both a light and heavy type, and justified a hope of successful development; but the exhibitions were in no sense conclusive or properly to be regarded as tests, and had not been made as such. A heavy gun, water-cooled, and a light gun, air-cooled, were finally completed and presented to the board for the tests held in the month of May, 1917. In regard to them the report of the board stated as follows:

". . . The board invites special attention to the tactical possibilities of the Colt automatic machine rifle, air-cooled, highly portable, designated above as the Browning air-cooled gun. According to reports received from observers, especially by Major L. T. Hillman, Ordnance Department, the drift of the French Army is decidedly towards greater use of automatic rifles of highly portable type, such as the Chauchat. In the British Army the Lewis gun

is used in much the same way, but, on account of its weight and size, not with equal facility."

The report of the machine gun board further stated in reference to the other Browning, the water-cooled gun: "This gun developed such remarkable reliability of function during the firing of over 20,000 shots, that a further test of 20,000 shots was fired by the same gun for endurance. . . . The only break was one sear after 39,500 shots; this caused the only stoppage directly chargeable to the gun."

The report of the board of May, 1917, upon its receipt by the War Department, was sent to the War College Division, General Staff, and eventually reached the Ordnance Department on June 24, 1917, with instructions, among others, that as soon as possible Browning light air-cooled automatic rifles be furnished to infantry at the rate of at least eight per company.

The program of procurement of machine guns and automatic rifles was based upon these instructions, upon considerations concerning the training of troops in the United States, and upon information from abroad as to the possibility of obtaining from the French Government an emergency supply of these weapons for the troops of the American Expeditionary Force first sent over, as well as on the plans for the armament of the various branches of the force. An item of such information was contained in a cablegram received from General Pershing on July 17, 1917, an extract from which follows:

". . . Suggest United States make every attempt

to secure greatest possible production Vickers type per month. At least two Vickers guns on every aeroplane synchronized with engines and equal number Lewis guns unsynchronized with engine. We should anticipate use three Vickers synchronized guns and three Lewis unsynchronized on every aeroplane. Pershing."

The use to which it was intended to put the Lewis guns in the American force in Europe was important in that it would govern the details of construction of the guns. For aeroplane service the cooling apparatus would be left off as unnecessary. Therefore, in order to avoid cross purposes between the Ordnance Department and the Expeditionary Force as to the use of these guns, and to ascertain the possibility of supply of others by the French, the Chief of Ordnance, on July 28th, caused the following cablegram to be sent to General Pershing:

"Pershing, Amexforce, Paris.
Number 67.

Paragraph 4. About 20,000 Lewis machine guns chambered for United States ammunition as recommended by recent gun board are being secured for delivery before June 30, 1918. Deliveries begin in August. Will these guns be wanted? Deliveries of either type of Browning gun cannot be expected in less than six to nine months. 4,000 Vickers guns should be delivered by December 31st. 2,500 Colt will be completed about September 15th.

(Signed) McCain."

In answer, General Pershing cabled as follows (CMG 472.555/910):

Date, August 5, 1917.
Number 9 N. Y. O.O.370.22/548.
From Paris.
"To the Adjutant General, Washington.
Number 85.

With reference to paragraph 4 your 67, and in connection with paragraph 1 my 61, arrangements completed to equip first two divisions with Hotchkiss machine guns and Chauchat automatic rifles. Subsequent divisions should be equipped in same manner until Vickers machine guns and a successful automatic rifle is furnished by Ordnance Department. Information desired as to when incoming divisions may be expected to arrive with machine guns and automatic rifles so furnished, this information needed to determine what material should be obtained from French Government. Lewis machine gun more suitable as automatic rifle, but recommended as armament for aeroplanes in paragraph 9 my 44, July 16th. Recommended Lewis machine guns be used for aeroplanes accordingly.

(Signed) PERSHING."

The large number of Lewis guns which were ordered had been intended for use either in aeroplanes, or, in advance of securing a supply of light Browning guns, on the ground; but the ability to secure from France machine guns of both light and heavy type sufficient for the armament of our forces until such time as light and heavy Browning or Vickers guns could be manufactured in this country, together with the appearance of the insistent demand for Lewis guns for the aviation service,

dictated instructions to the Savage Arms Company to manufacture all guns still under order from them of the aviation type, except 2,500 for use in the instruction of troops in this country. The event showed these instructions to embody a wise policy, which was adhered to till the end, notwithstanding severe criticism of the department by certain senators for not using the Lewis guns on the ground.

The development of the use for Lewis guns in the aviation service, in addition to the Vickers guns, called for the continuous manufacture of the Lewis guns, instead of for the ultimate cessation of this manufacture, which had been contemplated for the time when a sufficient supply of light guns and heavy guns for the land service should make the use of an intermediate gun no longer necessary.

About 180,000 machine guns and automatic rifles of the Vickers, Lewis, Colt-Marlin and Browning types were manufactured between the time of our entry into the war and the date of the armistice. This number was greater than the total number manufactured by the British during the same period, and somewhat less than the number manufactured by the French. With the providential assistance of the French in preventnig an early shortage due to our poor initial supply, our rate of manufacture soon reached a point such as to remove all fear that our troops might lack a sufficient number of weapons of this class. Our rate prior to the armistice reached more than 25,000 guns per month, which was twice that of the French or the English, and the quality of the Browning guns proved in service to be such

that both the British and the French Governments applied for the purchase of a supply for the armament of their own forces.

The only possible way in which the resources of the department could have been utilized to secure a greater supply of these guns at an earlier date would have been to use a larger proportion of the $12,000,000 appropriated in the Act of August 29, 1916, for the purchase of Colt guns, instead of putting the money mostly into Vickers guns, universally acknowledged to be a better type, but of which the delivery was slower than was promised and anticipated; which was the experience both of the United States and England. To meet the demands of the aviation service 23,000 Colt-Marlin aircraft guns, in addition to Lewis and Vickers guns were manufactured. The Colt-Marlin, a modification of the Colt, had developed a fortunate adaptability for airplane use.

I believe that this history shows that the wisest possible use was made of the funds available and the manufacturing facilities of this country and the allies, in providing the best available types of machine guns. As in the case of field-artillery, there was no way in which the long national neglect to provide a proper supply of these weapons could be immediately made good from our own resources, upon the outbreak of the war; but the full supply of our fighting troops with their needs, without failure in any instance, justifies the claim that the opportunity afforded by good luck was seized upon by good management.

The charge that government departments are inhospitable to inventors; that a cold reception is often followed by rejection of the device offered; and that it is only after the discouraged inventor has taken his device abroad and developed its merits with foreign help that the United States has recognized it, and has taken advantage of what it might have originally had with much less delay and expense, is heard with what ought to be disturbing frequency. The accusation has been made not only by disappointed inventors but by members of both houses of Congress, from the floor, and has been given wide publicity in the press, so that the public has been educated to believe it. The War Department, and within it the Ordnance Department as being the one most closely concerned with the field of mechanical invention, has been particularly subject to this charge, of which the general acceptance affords evidence of the popular tendency to regard the government official as a person of wooden-headed prejudice, prone to disregard suggestion from outside his own class. The tendency is so common that it must have some operating, though obscure, cause. The reasoning that there are nineteen useless inventions for one good one; that the disappointed are vocal while the successful are quiet; that an accusation is news while a defense is not, and the failure of response to the challenge to cite an instance within the last half century in which a device rejected by the War Department has afterward been shown to be useful —though many have been subsequently tested by

special direction of Congress—have apparently left the belief unaffected, as has the long list of inventions by others than officers which have been adopted and put in use by the War Department. Possibly the experience of some inventors like Hotchkiss and Maxim, who have not themselves complained but have taken their plans abroad for development in the more lucrative markets of Europe instead of trying to bring them out under the meager appropriations for military purposes in the United States, has not been understood here in their own country, and has been taken as evidence that they went abroad because they were not appreciated by their government. In such cases the development was usually made by foreign private capital, stimulated by the prospect of good sales which was absent in the United States.

In the case of the Lewis gun the charge of prejudice and unfair treatment was made by Col. Isaac N. Lewis, an officer of the army, on the active list at the time when his gun was first presented to the War Department, and subsequently retired. His status as an army officer justifies an examination of his charge and of his particular relations with the Ordnance Department. The country is entitled to know whether an important department of the Government is so conducted that persons with valuable suggestions to offer, along the lines which the department is specially created to consider, cannot expect even fair treatment at its hands.

Col. Lewis' charges have been made in correspondence and in the press, but they were made

with the most formality in his testimony before the Military Committee of the Senate on December 22, 1917. This testimony is found on pages 699 to 742 of the "Hearings before the Committee on Military Affairs, United States Senate, 65th Congress, 2nd Session; Part 2" in the "Investigation of the War Department." The parts relating to the alleged inability of Col. Lewis to secure consideration of his gun with reference to its test and adoption are as follows:

"*The Chairman.* I think, Col. Lewis, you probably have in your mind some chronological order in which you wish to make your statement to the committee, and probably that is the best way for you to do it.

*Senator Wadsworth.* There is no necessity for going back prior to the completion of the first model of the Lewis machine gun and its offer to the Government, as I understand an offer was made.

*Col. Lewis.* I would prefer, Senator, not to go into ancient history. The story, as I have intimated, is not a pleasant one, because I do not think it is a credit to the present organization of the Ordnance Bureau.

Before, however, I begin that story, I would like for once and all to settle the question as to whether Lewis has given his machine gun to the Government or tried to give it to the Government or not. It has been denied officially and unofficially so many times.

As early as 1911, when the first model of the Lewis gun was built, I took it myself to Washington.

I presented it in person to the Chief of Staff. I requested him to examine it. It had been developed without one cent of expense to the Government, during my odd time. I was then on important duty. I was senior director of the Artillery School at Fort Monroe. I wanted to submit the gun unreservedly for the use of my Government, giving up all rights of whatever nature in the invention. In doing so I asked that it be presented to the Bureau of Ordnance and to the members of the Bureau of Ordnance and Fortifications as early as 1912. (Page 700.)

. . . . . .

*The Chairman.* On what terms did you offer to let the Government have the gun?

*Col. Lewis.* On one condition, and I think in view of what I had gone through, I was justified in that. It was only on the condition that the official test would not be made at the Springfield Armory.

*Senator Hitchcock.* You mean that there was no royalty to be allowed?

*Col. Lewis.* So far as my interest was concerned. This gun, Senator, you will understand, has been developed under very discouraging circumstances. I was not a wealthy man. I was a poor man with a large family.

*The Chairman.* What other interests were involved besides yourself?

*Col. Lewis.* The present stockholders, the owners of the Automatic Arms Company. They gave the capital to develop my gun when I was not able to do it.

*The Chairman.* Had they made offers as to what they would charge?

*Col. Lewis.* They did not get that far. The offer was not considered. The gun was not accepted for further test. It was not considered. It was turned down flat. (Page 702.)

. . . . . .

*Col. Lewis.* I retired from active service five years ago, discouraged and disappointed. I went to Europe and expected to live in Europe. I played a lone hand in Europe. I did not have any friends. I had very little money back of me. A little group of Belgian bankers had bought the rights of the Lewis gun for Europe. The man at the head of that group closed a deal by which he purchased the European rights after seeing a single gun fired at a target from an aeroplane.

*Senator Hitchcock.* What year was that?

*Col. Lewis.* That was the fall of 1912. I think it was in November, 1912.

I would like to state at this time what occurred in Washington in August of 1912, a month or two before that. I left here in January, 1913. I did not go to Europe until I had given up all hope of having any chance to develop the Lewis gun in America. I had four guns made without expense to the Government of the United States. They were good guns. They fired American ammunition. They were ready for any test. As the events afterwards developed, they were successful enough to be adopted in the countries of Europe. Two of those guns were offered to the United States Signal

Corps free and without any question of price. They were offered for test during the time of the maneuvers in Connecticut in that year. General Allen was then the Chief Signal Officer. I was called up by a long-distance telephone in New York and was asked if I would permit the Signal Corps to have two guns for use during the maneuvers. I told them that I would be glad to do it. I would be glad to furnish even the pilot, as my son had offered his services, if he could be of any service, in shooting the gun from an aeroplane. The Lewis gun was the first one so used. It was fired out here at College Park, near Washington. That was the first shot ever fired from an aeroplane.

I came on to Washington. I supposed they would expect me over here.

In that connection, I would like to read a letter from the Acting Chief Signal Officer to me a few days later. It was one of the factors that decided me in going to Europe. This letter is dated "Office of the Chief Signal Officer, August 12, 1912." It is addressed to "My dear Col. Lewis," and reads as follows (reading):

August 2, 1912.

My dear Col. Lewis:

I spent a good part of the morning a day or two ago endeavoring to straighten out the matter of the use of your gun during the maneuvers and have seen Gen. Wood and Gen. Crozier on the subject. The latter has entered what amounts to a protest against the use of the gun during the maneuvers by the Signal Corps of the Army.

Of course, these maneuvers are official, and it is

presumed that this protest must be considered as final. The ordnance gun will be tried. I regret that your gun cannot be officially tested and used.

General Wood, in an official paper written by me after I had my personal conversation with him, of which I wrote you, has put the following indorsement, as I am told, though the paper has not yet come into this office:

"The whole matter of the test of this gun is now under consideration.

"Until the matter is settled, it is not believed any official action should be taken."

This bars the use of the gun at the maneuvers, but I am informed by the Chief of Staff that any unofficial use of the gun with the militia or not during actual maneuvers or at College Park will probably not be objectionable.

Very truly yours,

GEORGE P. SCRIVEN.

The protest that is referred to in that letter took the shape of a declination on the part of Gen. Crozier to furnish American ammunition to fire in the gun. When it was put in that shape, I refused to purchase the ammunition. I thought that if I furnished the gun and the aviator they might furnish the ammunition. I ask you, gentlemen, if after receiving a letter like that in response to your offer you would have urged it any further.

*Senator New.* What was the indorsement upon that?

*Col. Lewis.* That is a letter written by Gen. Scriven, who is still living. He succeeded Gen. Allen as Chief Signal Officer. This was in 1912. (Page 706.)

*Senator Wadsworth.* In the tests which resulted in the Birmingham contract, was American ammunition used?

*Col. Lewis.* Yes, sir; I had the British ammunition later because the gun was going to the British service. We used Russian ammunition in the Russian service and Belgian ammunition in the Belgian service. We have been doing that for years. We are now delivering 300 Lewis guns every week to aeroplanes crossing the English Channel.

That brings me to the point as to this question of making all the output of the factory of the aeroplane type. I will tell you what we are doing in Birmingham. They are making 300 a week for the aeroplanes and 1,300 a week for trench purposes. Both are carried on together. The reason it is not done here is that they want to kill the Lewis gun.

*The Chairman.* Why do they want to do that?

*Col. Lewis.* They want to take the label off of it. The Lewis label will stick to the Lewis gun as long as Lewis is alive.

*Senator Hitchcock.* It has been emphasized here that parts of the Lewis gun broke in its test in May, 1913.

*Col. Lewis.* I am glad that you touched upon that point. I will tell you why the gun did not do well. That gun was made in England. It was made to fire American ammunition by our British company. Remember, I had taken two guns over there. They had to be dismantled. The test at Springfield, in 1913, was with the last gun entered. In that test the guns were entered over my protest and against

my judgment and in spite of my personal protests. I did not want to send the guns up for the tests. It was put up to me by my associates that I should do it.

*Senator Hitchcock.* I thought you were anxious to have the Government use the gun and to have it tested.

*Col. Lewis.* Not at that time, I was not.

*Senator Hitchcock.* Then, there was some warrant for Gen. Crozier's statement that at the tests in 1913 that individual gun did not behave very well?

*Col. Lewis.* Do you mean that the parts broke?

*Senator Hitchcock.* Yes.

*Col. Lewis.* So did every other gun tested at the same time. Every gun tested at the same time broke.

*Senator Hitchcock.* Was there not some admission of that character made—some official admission?

*Col. Lewis.* I beg your pardon?

*The Chairman.* You had to confess that it did not meet the requirements.

*Col. Lewis.* There was no confessing it. There is no use confessing such a thing when the broken parts are before you.

*The Chairman.* That is not the question.

*Senator Hitchcock.* I am asking you whether you know that any one had made that admission or not?

*The Chairman.* Yes. The admission, in substance, was that there had been a fair test and that the Lewis gun did not come up to the test shown by the other guns.

*Senator Hitchcock.* That was the 1917 test?

*Col. Lewis.* No, sir; that was 1916.

*Senator Hitchcock.* Let us see the letter, if you have it there.

*Col. Lewis.* I misunderstood you, Senator.

*Senator Hitchcock.* It has been stated to this committee that you were given a test, or several tests.

*Col. Lewis.* At Springfield, yes.

*Senator Hitchcock.* And that the tests were not satisfactory and that your company, or somebody connected with the company, admitted that the guns were not satisfactory.

*Col. Lewis.* As I told you, the guns that we sent over for that test in 1913 were the first two guns made by the Birmingham Small Arms Company. There was a time limit; the guns had to be here at a specific date, and if we did not send them here they could not be entered in official tests. We had never made an American gun over there. We were then making the British guns.

*The Chairman.* And for British ammunition?

*Col. Lewis.* For British ammunition, yes. At that time we hurried with the two guns and converted them so they would be able to fire American ammunition, and the guns were sent over here without a sufficiently exhaustive firing test in England. We admit that.

*Senator Hitchcock.* Who notified you to come for that test?

*Col. Lewis.* My associate, Mr. Calfee, arranged

that with Gen. Crozier, if I am not mistaken, very much against my judgment.

*Senator Hitchcock.* So Gen. Crozier did give you an opportunity to present your gun for test in 1913 and again in 1916?

*Col. Lewis.* Oh, no. I have been abroad since then.

*Senator Hitchcock.* But Gen. Crozier gave you opportunity to have the Lewis gun tested on those two occasions?

*Col. Lewis.* The first test. I am not sure about the other test, because I have not been here. My son represented me at the test in 1913, because he wanted to see the guns. I was fearful that they would not behave well, as they had not been tested at home. My son went before the board, and he had a very hard time because of the fact that many parts of the gun broke in that test, but still the gun fired 20,000 rounds of American ammunition in a very short length of time, notwithstanding the breaking.

*Senator Hitchcock.* At that time was your factory in Great Britain turning out any considerable number of guns?

*Col. Lewis.* No; we had not then turned out our first British gun at that time. These were the first two guns made—the first two guns that the Birmingham Small Arms Company had made—and they were not properly made. The material was not properly tempered.

*Senator Hitchcock.* When was it that the factory in Birmingham began the output of the guns?

*Col. Lewis.* On a large scale our first interchangeable guns were delivered to the British Government under contract in 1914. I think it was in November, if I am not mistaken. I think war was declared on the 3d of August, and we did not get real deliveries of these interchangeable guns under our contract with the British Government, although we had been working eighteen months at it, until November of 1914. I am quite sure, Senator.

*Senator Hitchcock.* Prior to 1913 you were not in shape to offer guns to Gen. Crozier, were you?

*Col. Lewis.* What do you mean?

*Senator Hitchcock.* You had no factories established?

*Col. Lewis.* No; certainly not. I had not the money to establish a factory.

*Senator Hitchcock.* And when the test was made of your first output of the British factory it was premature?

*Col. Lewis.* Very much so, and against my judgment.

*Senator Hitchcock.* And it failed on that occasion?

*Col. Lewis.* Simply on account of certain breakage of smaller parts, utterly minor parts, which did not affect the design of the gun. The design to-day is just as it was then, no better and no worse.

*Senator Hitchcock.* Would you consider the test a failure?

*Col. Lewis.* Certainly not. I have been witnessing government tests for nearly forty years, Senator.

*Senator Hitchcock.* What other guns were tested in 1913?

*Col. Lewis.* The Coventry gun, the Vickers gun, the Madsden gun, and the Benet-Mercié, I think, were tested at that time. (Page 710.) . . .

*Senator Hitchcock.* At the time Gen. Wood was Chief of Staff did you make an effort to go over the head of Gen. Crozier to the Chief of Staff?

*Col. Lewis.* I did. I went personally to him and offered him my gun.

*Senator Hitchcock.* What was the attitude there?

*Col. Lewis.* They had a meeting of the board. They were both members of the Board of Ordnance and Fortifications. Gen. Wood, who was the senior member of the board, was absent, and that made Gen. Crozier ex officio president of the board in his absence. When the matter came up Gen. Wood was detained on other business, and Gen. Crozier, being ex officio president of the board, turned it down.

*Senator Hitchcock.* And you were unable to get any one to overrule Gen. Crozier?

*Col. Lewis.* Oh, no. He is absolutely autocratic, Gen. Crozier. You gentlemen year after year have been hearing Gen. Crozier's testimony in regard to the ordnance conditions in the country, and you can judge better the representations he has made than I can.

*The Chairman.* May I ask you in a general way what is the trouble with the Ordnance Department? You are an old Ordnance officer?

*Col. Lewis.* No; I am an Artillery man. I belong to the fighting branch.

*Senator Hitchcock.* We have inferred that, Colonel.

*Col. Lewis.* I am still fighting. I am sixty years old, but I am still in the ring.

*Senator McKellar.* That is plainly evident.

*The Chairman.* What is the trouble there? If there has been a fall down in this emergency, where is the trouble and what is the trouble?

*Col. Lewis.* It is primarily at the present time with the man who is Chief of Ordnance. There has not been a new idea or a new development in ordnance in America in fifteen years. We haven't a new gun to-day in our coast fortifications; that is, new within fifteen years.

*The Chairman.* Are the methods at fault?

*Col. Lewis.* It is not so much Crozier as it is Crozierism that is at fault. That is what this country is suffering from.

*The Chairman.* Has he developed the Ordnance Department under this present system and method——

*Col. Lewis* (interrupting). Certainly. It is a one-man machine, Senator.

*The Chairman.* How long has he been connected with it?

*Col. Lewis.* Fifteen years—I think, sixteen years. I think he has been Chief of Ordnance sixteen years.

*The Chairman.* As a matter of fact, is not the system about as it was before he went in?

*Col. Lewis.* Oh, yes. It was the same thing

under his predecessor. I had the same trouble under his predecessor, also.

*The Chairman.* That is what I am getting at.

*Col. Lewis.* It is the system, Senator.

*The Chairman.* It is not the man; it is the system?

*Col. Lewis.* In my particular case it is the man. The head of a great bureau has simply used his office as a vehicle for personal malice and envy toward a man who is not in the ring. I have been invited to join the ring, Senator, so I know there is one.

*Senator Weeks.* What do you mean by the "ring," Colonel? Just a moment before you answer that question. I think you are talking in a very desultory way and not accurately. You are pretty loquacious. Get right down to facts, and answer the question directly, and tell us what you mean by the ring.

*Col. Lewis.* If I could tell you the system that has controlled the production of ordnance, the design of ordnance, and the purchase of ordnance, and supply of arms and ammunition ever since I have been in the service—and I have had active contact with it for nearly thirty-eight years——

*Senator Weeks.* Do you mean to say there is anything dishonest about it?

*Col. Lewis.* No. I am not saying there is any pecuniary graft. There are many kinds of graft in this world besides money graft, Senator.

*Senator Weeks.* What kind of graft do you mean?

*Col. Lewis.* It is the same thing as in politics, Senator. A man who is loyal to his party at the expense of the State is, to my mind, exactly analogous to the man who is loyal to a bureau chief at the expense of his country. That is what I mean by a ring.

*Senator Weeks.* Let us commence with the bureau chief. In what respect is he at the head of a ring?

*Col. Lewis.* He is it.

*Senator Weeks.* Assuming that he is it. Is not he following his judgment?

*Col. Lewis.* Why, presumably so; yes.

*Senator Weeks.* Then your charge reduces itself to the fact that he is inefficient?

*Col. Lewis.* Oh, it is hopelessly inefficient under our present bureau system.

*Senator Weeks.* Anything else?

*Col. Lewis.* Prejudice, do you mean? Professional prejudice; yes.

*Senator Weeks.* That would be included in inefficiency.

*Col. Lewis.* Inefficiency, yes. I certainly do not mean corruption.

*Senator Weeks.* You mean to say that everybody in the Ordnance service is inefficient?

*Col. Lewis.* No; I do not say that.

*Senator Weeks.* You said a moment ago——

*Col. Lewis.* There are still good men——

*Senator Weeks.* You said there had not been an ordnance expert developed in this country for fifteen years a moment ago.

*Col. Lewis.* I mean in the broad view of ordnance that is true.

*Senator Weeks.* You mean to say there is not an efficient man in the Ordnance Bureau?

*Col. Lewis.* A man may be efficient in his limitations and not be an expert, Senator. There are lots of good, conscientious and efficient men that are not experts. (Page 711.) . . .

*Senator Frelinghuysen.* Col. Lewis, in August of 1912, who was the Chief of Staff?

*Col. Lewis.* I think Gen. Wood was Chief of Staff.

*Senator Frelinghuysen.* Did he not practically govern the policy of the Ordnance Department at that time?

*Col. Lewis.* No. The Chief of Staff does not govern its policy now, Senator.

*Senator Frelinghuysen.* Who governs it?

*Col. Lewis.* The Secretary of War, if it has any government.

*Senator Frelinghuysen.* Who was the Secretary of War in August, 1912?

*Col. Lewis.* I have been away so many years that I do not remember; but I think it was Mr. Stimson. I can say that Gen. Wood has been very favorably disposed toward the Lewis gun and has been very much in favor of its adoption, Senator.

*Senator Frelinghuysen.* Was he at that time?

*Col. Lewis.* Yes; very much so.

*Senator Hitchcock.* Do you attribute the failure on the part of the Army to adopt and use your gun to the constant opposition of Gen. Crozier?

*Col. Lewis.* To him and his immediate coterie in the Ordnance Department.

*Senator Hitchcock.* Can you name other officers?

*Col. Lewis.* Senator, I do not want to do any injustice to any younger officers. That is a one-man bureau, and I think one man ought to bear the brunt of it. (Page 733.) . . .

*Senator New.* Col. Lewis, you feel, then, summing it up here, that if the United States Government, through its Ordnance Department, had viewed the Lewis gun from the same friendly standpoint that it did the Browning gun, when it was originally introduced for its inspection, that the Lewis gun would have been accepted on its merits?

*Col. Lewis.* There would have been no Browning gun.

*Senator New.* There would not have been any Browning gun?

*Col. Lewis.* No, sir.

*Senator McKellar.* And you also think the United States Government would be better supplied with machine guns if it had adopted your gun, of course?

*Col. Lewis.* I certainly do, and a very much larger number of them. I might say among the letters attached to my letter inclosed to the Secretary you will find a letter of October 16th, addressed to the president of the Machine Gun Board, in which I offered to produce a light gun, such as the Browning is; I offered to come back—to give up my European work to come back to the United States to develop that gun at my own expense—and I would

present it to the Government without any compensation, direct or indirect, in any shape.

*Senator New.* You made such an offer as that in October, 1916?

*Col. Lewis.* Yes, sir; I can read the letter.

*Senator New.* Is that letter in the record? I think it ought to go in the record.

*Col. Lewis.* Col. Lewis had made machine guns, and Mr. Browning has not. Now, Mr. Browning is a great inventor, a great pistol and rifle inventor, but he never has made a machine gun. I offered to do it for nothing; I would have been glad to; I think it would have been as good a gun as the Browning, perhaps—naturally, I think so—it certainly would not have cost the Government $1,250,000.

*Senator Frelinghuysen.* Did the Ordnance Department inform you that they would accept for test the Lewis gun rechambered to Springfield ammunition?

*Col. Lewis.* They never informed me, Senator, I was on the other side. I had nothing whatever to do with those tests; I did not even know of them.

*Senator Frelinghuysen.* How was that test brought about—the reopening of the negotiations?

*Col. Lewis.* I think the Savage Arms Company —Mr. Borie, did you not take that up with the Savage Arms Company?

*Mr. Borie.* Yes, all those questions came up with us.

*Senator Frelinghuysen.* What I am trying to develop, Mr. Borie, is this: That either through preju-

dice or for scientific reasons the Ordnance Department objected to the use of the Lewis gun, and there were no tests made from August, 1912, until we entered this war, and the Lewis gun was not in use.

*Mr. Borie.* There was a test made in 1913, before I had anything to do with the gun.

*Senator Frelinghuysen.* Nevertheless it was not accepted at that time?

*Mr. Borie.* No, sir; and in 1916 there was a partial test made, in which I was interested, but then the gun was not adopted. Then, as I recited this morning, the Ordnance Department bought 350 of the English guns, and then the Secretary of War took the matter of the machine-gun controversy out of the hands of the Ordnance Department and appointed this machine-gun board, consisting of nine men from all branches of the service. That was after rather an acrimonious correspondence between Gen. Crozier and myself, on which we insisted that the gun be given a fair test, not an armory or laboratory test, and suggested that a board composed of all branches of the service, including the Navy, should be appointed to pass on the gun. The machine-gun board met in the fall of 1916 and reviewed old tests, and after hearing from Mr. Hanson, for instance, whose letter I quoted as to the enormous capacity of the Colt works, they ordered some Vickers guns, and they set May 1, 1917, as a date to test all light machine guns. Then we entered the war, and I told you the rest of the history.

*Senator Frelinghuysen.* Was the Lewis machine

gun tested for the Springfield ammunition—our ammunition—by the Ordnance Department?

*Mr. Borie.* In 1916 we gave this partial test at Springfield; it was not satisfactory.

*Mr. Frelinghuysen.* Was it accepted?

*Mr. Borie.* No, sir; the recommendation of the board was that the machine gun—I think we have got the record somewhere here—in the opinion of the board, it was not satisfactory for our service arm, but that in the opinion of the board the Savage Arms Company should continue to develop the gun, in the expectation that it would prove satisfactory. Was that not about the gist of it, Mr. Calfee; was not that the gist of the report of the 1916 test? You have got it in your records there. But the Lewis gun was not accepted by the United States Government as a standard arm until after the Winthrop test for the Navy, and then the other test at the Springfield Armory.

*Senator Hitchcock.* Then you received an order for 1,300?

*Mr. Borie.* From the Army, and 3,500 from the Navy.

*Senator Hitchcock.* And subsequent to that you have received an order for——

*Mr. Borie.* Well, those orders I gave you—2,000, 4,400 and 12,000; then 22,000.

*Senator Frelinghuysen.* Has the Lewis gun ever been officially adopted by the Ordnance Department?

*Mr. Borie.* It has been adopted as the service arm.

*Col. Lewis.* Yes, sir; it has been since last May. (Page 740.) . . .

. . . . . .

It appears from this testimony and the preceding narrative (page 79) that when the Lewis gun was first officially offered to the Government for test it was offered with a string to it; that the test should not be of the kind to which military inventions are usually subjected by the agencies maintained by the Government for the purpose, but should be of a particular kind, by another agency, proposed by the commercial company presenting the gun. The Board of Ordnance and Fortification, a statutory board for considering and testing inventions, composed of the Chief of Staff, an officer of Engineers, an officer of Ordnance, three officers of Artillery and a civilian, did not turn the gun down in the absence of Gen. Wood as testified by Col. Lewis, but offered a test in which the usual procedure would be followed, and which would include the kind of test which those presenting the gun desired. The proceedings of the board setting forth this action were signed by Gen. Wood, as the presiding officer when they were taken.

In the same month in which the test was offered by the board, July, 1912, occurred the incident referred to by Col. Lewis of a proposed test of the Lewis gun in firing from an aeroplane, by the Signal Corps. The Signal Corps was not the agency for making tests of machine guns, had no experts or facilities for doing so, and undoubtedly wished only to test the firing of *a* machine gun from an aero-

plane. The matter is explained by the following correspondence between the Acting Chief Signal Officer and myself:

37819/392.

War Department,
Office of the Chief Signal Officer,
Washington, July 17, 1912.

Chief of Ordnance, United States Army.
*Sir:*

I have the honor to state that it is contemplated trying the Lewis gun with the aeroplanes during the coming maneuvers to be held in the vicinity of New York, N. Y., in August next, and it is requested that 5,000 rounds of ammunition for the service rifle be issued to the Signal Corps for the purpose.

If it is considered necessary, reimbursement can be made by transfer of funds from appropriation Signal Service of the Army, 1913.

Very respectfully,
George P. Scriven,
*Colonel, Signal Corps, U. S. Army,*
*in charge of Office.*

37819/396

War Department,
Office of the Chief of Ordnance,
Washington, July 27, 1912.

The Chief Signal Officer, U. S. Army.
*Sir:*

1. Replying to letter from your office, dated 17th instant (O. O. 37819/392), in regard to the supply of five thousand rounds of ammunition for the purpose of trying a Lewis gun with aeroplanes during the maneuvers to be held next month in the

vicinity of New York City, I have the honor to inform you that this Department would not be authorized to supply ammunition for the trial of a gun not under test with reference to its adoption in the service, and that the representatives of the Lewis gun have not accepted the offer of the Board of Ordnance and Fortification to test their gun with reference to that object.

2. I will be glad, however, to furnish the Signal Department with an automatic rifle of the present service type, which weighs about 22 pounds; to fit it to an aeroplane, or to furnish the appliances for doing so, and to supply a suitable number of rounds of ammunition, without expense to the appropriations of the Signal Corps, for such test as you may desire to make with them.

3. Of course, this Department will be glad to furnish any number of rounds to the Signal Department, at the expense of the appropriations of your Department, without question as to the purpose for which you may desire them.

Respectfully,

WILLIAM CROZIER,
*Brig.-Gen., Chief of Ordnance, U. S. A.*

It is seen from these letters that I was willing to furnish ammunition at the expense of the Signal Corps' appropriations for a test of the Lewis or any other gun, but the Acting Chief Signal Officer was governed by the view of the Chief of Staff quoted in the former's letter to Col. Lewis, that "The whole matter of the test of this gun is now under consideration. Until the matter is settled, it is not believed any official action should be taken."

It was after his failure to secure this *quasi* test, as a side issue to a trial of machine gun fire from

an aeroplane, while there was still pending a definite offer to give his gun the usual test including one of his own kind, that Col. Lewis testifies that he retired from active service, discouraged and disappointed, and went to Europe to look after the manufacture of his gun—after the European rights therein had been bought by a group of Belgian bankers. It is evident that he did not retire and go abroad because of refusal to consider and test his gun, but in order that he might command all of his time to exploit it for profit, while under pension by his Government.

In the following spring, 1913, the Automatic Arms Company, not having taken up the offer of the preceding July to test a Lewis gun, came forward again with a proposal that a gun be tested. The proposal was accepted; the usual procedure of convening a board to conduct the test was followed, and the gun was tested, together with several other types, in the following September. This was the first test made by the United States Government of a Lewis gun, and it failed by malfunction and the breakage of parts. (See page 81, and the testimony of Col. Lewis quoted above.) The claim in behalf of the gun that the failure was due to poor manufacture and defective material may very well have been true. Neither the Ordnance Department nor the Board of Ordnance and Fortification ever found any fault with the principles of construction of the Lewis gun; but from the beginning, and after each failure, offered to make further tests of the gun if and when it should be desired.

From the preceding narrative (page 82) it appears that no further proposition to test the gun was made until the Ordnance Department itself brought up the subject, in September, 1915, by asking the Savage Arms Company to present a gun for test; that company having taken up the manufacture for the Canadian army. Then it was not until April, 1916, seven months afterward, that a gun was presented and a test held, with the poor result stated.

This was the last official test under the War Department before the one of April, 1917, under the Navy Department, which was the first at which the gun performed well, after many changes in it, and after which it was accepted and large orders were given by the Ordnance Department for its manufacture. But in the early part of June, 1916, a comparative test of the Lewis and the Benet-Mercié guns was held at Plattsburg by a board convened by verbal order of Gen. Leonard Wood from among his own officers. The Lewis gun used in the test was one made by the Savage Arms Company to use British ammunition, and was reported by the board to have performed excellently in the test, while the Benet-Mercié performed very badly. Report of the test was not made to the War Department by Gen. Wood until over a month afterward, in a letter of July 29th; but a copy of the report of the board was furnished the Savage Arms Company, and the company sent a copy to the Secretary of War on June 29th. I received my first information of the test through the company, and in reply said, among other things: "I hope that this last

performance indicates that progress has been made in overcoming such defects as previous tests have shown, and that the gun in which this Government is now investing a considerable sum has reached a stage in which it can be relied upon to render first class service." The immediately subsequent performance of the gun on the Mexican border, however, which has been previously described (page 88), showed that as made in this country it had not yet reached a reliable stage; while the Plattsburg test itself was inconclusive in that less than 2,000 rounds were fired from the gun as against 20,000 or more required for a proper test, which should include at least 15,000 rounds for endurance.

Notwithstanding the failures to get a performance from the Lewis gun, with either English or American ammunition, which would justify its adoption for the service I realized that the continued use of the gun by the English in the war, and the absence of effort on their part to replace it with another model, raised a presumption that it ought to be possible to manufacture it to give good service in this country. It was apparent, of course, that the American model was not the same as the English one; and also the English use of the gun afforded no comparison between it and the Benet-Mercié, the former service gun, which had been declared to be its superior by every board, except the Plattsburg one, which had considered both, and which is still the British model for the cavalry and for tanks. The Benet-Mercié, however, had been superseded in the United States by the Vickers; the manufacture

of it here had ceased and the manufacturing equipment had been dissipated; and, besides, the need for an additional type lighter than the Vickers had appeared. I, therefore, as related on page 97, made the recommendation designed to afford two and a half months from the middle of August, 1916, for the perfection and presentation for further test of a Lewis gun or any other, and reserving $6,000,000 for investment in the light of the test. The board appointed by the Secretary of War, however, reserved only $1,500,000, and this sum was invested in it after the test of April, 1917, had shown it to be fit for purchase.

Col. Lewis' charge of prejudice and unfair treatment for himself and his gun is accentuated by statements from him to the effect that the refusal to consider his gun for test was in the face of an offer on his part, alleged to have been repeatedly made, to give the free use of the gun to the Government, without any payment of royalty to himself as the inventor. These statements were spread widely through the press, and are repeated in his testimony before the Senate Military Committee, as follows:

*Col. Lewis.* I wanted to submit the gun unreservedly for the use of my Government, giving up all rights of whatever nature in the invention. . . . I repeat, that I offered to give my gun to the Government. I made the offer to the Chief of Staff in 1912. First I made the offer in 1911 and then again in 1912. I also told the present Secretary of War, in his own office, in June, 1916, when I

was over here from Europe for a few weeks, that I had offered it, and then desired to make him a present of my interest in the gun, the Lewis gun, without any emolument whatever. None of my offers has been accepted, and the peculiar thing is that even the fact of the offers having been made has been denied. That is the puzzling thing to me.

*Senator Weeks.* Were they ever made in the presence of witnesses?

*Col. Lewis.* I think there are two or three officers still in the War Department who know about it. There is an official statement of the Chief of Staff and the president of the Board of Ordnance and Fortifications that I did make the offer.

*Senator Hitchcock.* Who was Chief of Staff when you originally made the offer?

*Col. Lewis.* Gen. Wood.

*Senator Hitchcock.* Who was Chief of Ordnance?

*Col. Lewis.* Gen. Crozier.

*Senator Weeks.* Those offers were not made in writing?

*Col. Lewis.* The original offer was not made in writing.

*Senator Weeks.* Who were present when you made these different offers?

*Col. Lewis.* Gen. Wood, Gen. Weaver, and Col. Kilbourn. There were one or two other officers on duty. I could probably verify my recollection. It was a matter of common knowledge. (Page 701.)

*Col. Lewis.* I would like to have permission to read to the committee a letter which I have here,

in order that this question may never be the subject of controversy again. It is a letter to the Secretary of War under date of December 11, 1917. I have made one final effort to divorce my personal pecuniary interest from the Lewis gun.

December 11, 1917.

THE SECRETARY OF WAR, Washington, D. C.

*My dear Mr. Secretary:*

In accordance with the understanding reached during our very frank talks at your office in Washington on Friday and Saturday last, I beg to submit the following:

1. I now believe, and have believed since our first conference in June, 1916, that you have intended to act fairly and with exact justice toward me in all matters relating to the Lewis machine-gun controversy. It is a fact, however, that acting upon incomplete information and very complete misinformation furnished you by others, you did me serious injustice in the authorized issue of the official Press Bulletin No. 111, of October 28, 1916; in the interviews relative to the subject-matter of that bulletin given by you at the time to representatives of the public press of the country; and in your testimony before the Military Committees of the Senate and House of Representatives during the official hearings in January, 1917.

I accept without question your statement and assurance that the injustice was not intentional, and I understand it to be your intention at an early date to right the wrong in some suitable public manner.

2. I therefore renew in the most definite and positive terms possible under the changed conditions, the offers I made to the War Department in 1911

and again in 1912, through the Chief of Staff and the president of the Board of Ordnance and Fortification.

3. At the present time approximately 40,000 Lewis machine guns, together with a large number of spare parts and necessaries, remain undelivered on the orders already placed by the War Department. My share of the total royalty to be paid to the manufacturers under the present license agreements on these 40,000 guns and spare parts would amount to approximately $2,500,000, and the very large additional orders for Lewis guns and spare parts which will undoubtedly be placed by the War Department would still further add to the royalty payments legally and equitably due me in the future. I now offer to turn over to the Treasury of the United States, as and when due me under existing contract agreements, all of my part of such royalty payments, and upon the acknowledgment and acceptance of this offer by you I will duly execute all necessary and proper instruments to carry out this offer, in order that there may be paid into the Treasury of the United States instead of to me all of my share of the above-mentioned royalty payments. It is definitely understood and intended by me that from and after January 1, 1918, provided this offer is accepted by that date, I shall receive no compensation whatever, direct or indirect, as royalty or otherwise, for any Lewis machine gun or component part or accessory thereof, that may thereafter be manufactured by, for, or sold to the Government of the United States for its own use and benefit.

4. The Lewis machine gun is no longer a new and untried weapon. It has successfully met every military requirement under a grilling test of more than three years of daily service on the battlefields of Europe during this the greatest war in history.

Seventy thousand Lewis guns have already been supplied to the fighting forces of the Allies in England, France, Belgium, Italy, and Russia, and our factories in England, France and America are at the present time adding to the number already in the service at the rate of approximately 2,000 guns per week. In the British tanks now doing such effective work on the Western front there are more than 12.000 Lewis guns, no other type of machine gun being used by the British for tank service.

I may also properly add at this late date that of the twelve Zeppelins so far brought down by the British ten were brought down by Lewis guns alone.

5. In connection with my definite offer in paragraph 2 above, I beg to invite special attention to the following letters now of record in the official files of the War Department, namely:

(a) Letter to me from the Adjutant General, dated July 10, 1900.
(b) Letter to the Adjutant General, dated October 20, 1900.
(c) Letter to Chief of Artillery, dated November 10, 1906.
(d) Letter to Military Secretary, dated February 19, 1907.
(e) Letter to President, Machine-gun Board, dated October 16, 1916.
(f) Letter to Adjutant General, dated February 5, 1917.
(g) Letter to Secretary of War, dated February 16, 1917.
(h) Letter to Secretary of War, dated May 12, 1917.

(Copies of which letters are attached hereto.)

Very respectfully, your obedient servant,

I. N. Lewis,
*Colonel, United States Army, Retired.*

I would like to state to the committee that my share in this company is forty-three per cent. Therefore, any arrangement now made with the Government by the Automatic Arms Company will reduce the amount paid by the Government automatically by forty-three per cent.

*The Chairman.* Those letters will go into the record with the one that you have read.

*Col. Lewis.* All right.

*Senator Hitchcock.* Was this $2,500,000 which you offered to the Government on existing contracts practically carrying out your original offer?

*Col. Lewis.* Exactly. I do not want to receive, directly or indirectly, one penny from any Lewis gun that may be produced.

*Senator Hitchcock.* When did you make the original offer?

*Col. Lewis.* First in 1911, and again in 1912.

*Senator Hitchcock.* And you have kept it alive ever since?

*Col. Lewis.* I beg your pardon?

*Senator Hitchcock.* You have kept at it ever since?

*Col. Lewis.* If you are interested in that I would like to read you a letter forwarding a check for my royalties on the three hundred and fifty-three guns of the British, to which I was entitled. They were made for Great Britain, and as soon as I received the royalties I immediately forwarded a check for the amount to the Secretary of War.

*Senator Hitchcock.* When was that done?

*Col. Lewis.* That letter was sent on the 16th day

of last February, after I returned from Europe. The letter was never acknowledged, except that it had been referred to the Adjutant General to decide if he would advise its acceptance. General Crozier advised, in strong terms, that it be not accepted.

*The Chairman.* It was sent back?

*Col. Lewis.* I wrote another letter insisting upon the acceptance. The letter is here with the correspondence, except the reply of the Secretary of War.

*Senator Hitchcock.* Was the check finally accepted?

*Col. Lewis.* It was accepted, but it was never acknowledged. No government official ever acknowledged receipt of it.

*Senator McKellar.* What is the amount?

*Col. Lewis.* It was made in two parts. One was for approximately $11,000 directly due to the Government. The other was approximately $6,700 due to the Automatic Arms Company, because I wanted to refund the entire amount. In all, it amounts to about $17,000.

*Senator Hitchcock.* Does the Automatic Arms Company have a forty-eight per cent interest?

*Col. Lewis.* I own forty-three per cent.

*Senator Hitchcock.* The Automatic Arms Company owns fifty-seven per cent?

*Col. Lewis.* Fifty-seven per cent; yes, sir.

*Senator Hitchcock.* Have you any interest in the Automatic Arms Company?

*Col. Lewis.* I have not. I still own my stock, but I shall never have any interest, so far as it relates

to the gun. I have fixed it up so that it may be paid directly into the United States Treasury.

*Senator Hitchcock.* But you are a stockholder in the Automatic Arms Company?

*Col. Lewis.* I am. I shall not profit to the extent of one cent, however—not one penny.

*Senator Hitchcock.* From this large order that has been placed for the Lewis gun, the Automatic Arms Company will pay a part of its dividend into the Treasury, in addition to what you personally pay?

*Col. Lewis.* All of my share I pay into the Treasury. A proportionate part of my stock holding will be paid directly into the Treasury of the United States.

*Senator McKellar.* Why do you do that, Colonel Lewis?

*Col. Lewis.* Well, that is rather a difficult question to answer. I suppose it is a psychological affair.

*Senator Hitchcock.* Perhaps because you do not need the money?

*Col. Lewis.* Senator, I do not need the money. I have made every penny I possess. I have never had a dollar given to me by anybody in this world.

*Senator Weeks.* The probabilities are that your offer will be accepted after you have paid the excess-profits tax.

*Col. Lewis.* And I shall still have to pay the income tax.

*Senator McKellar.* I would like to know your feelings as to why you turned this over to the Government.

*Col. Lewis.* Well, Senator, I asked one of my closest personal friends what he thought of it. He told me this: He said it was a very handsome thing to do; that it was a very patriotic thing to do. But I said, "That is not what you think. You think I am a —— fool, don't you?" That is what he does think to-day.

*Senator McKellar.* Your idea is that you ought to help the Government along, having been an officer of the Government.

*Col. Lewis.* Absolutely. I got my education at the Government's expense. I have been persecuted by the Government and therefore I want to pay it back in good money—give good money in return for it. (Page 702.) . . .

*Senator Hitchcock.* Was that check, for something over $300,000 that you sent to the War Department——

*Col. Lewis.* Pardon me, Senator, I did not have $300,000 at that time; it was only $11,000—the first check—and there was $6,700, approximately $17,000 in all, that I returned for the three hundred and fifty English caliber guns that were furnished our troops last summer—that is, the summer of 1916.

*Senator Hitchcock.* Those were the only remittances you have made to return your royalty to the Treasury?

*Col. Lewis.* Yes, sir; I have waited for a year to find out whether the checks were accepted.

*Senator Hitchcock.* They were finally accepted?

*Col. Lewis.* They were. If they had been accepted it was fully my intention to have continued, and

every penny of royalty I received would have been returned to the United States Government.

*Senator Hitchcock.* I understood you made a written offer also to the War Department to return a very large sum of money?

*Col. Lewis.* Absolutely, in writing. It is before the Secretary now.

*Senator Hitchcock.* To cover your share of the royalty on all the Lewis guns that had been ordered already or might be ordered?

*Col. Lewis.* No, sir; to take effect on the 1st day of January, because I have felt I have gone to the extent of my obligation as an officer and a gentleman, to return money to the United States Government, inasmuch as I have never had a word of acknowledgment; I have never had a word of appreciation from my Government in the thirty-eight years of my service, in any shape.

*Senator McKellar.* Do I understand you to say they finally accepted your checks, but never wrote you a letter saying——

*Col. Lewis.* It was just a clerical oversight, only I did not know the check had been accepted until within ten days.

*Senator McKellar.* They never did write you, saying they had accepted the money?

*Col. Lewis.* No, sir; not until the Secretary of War told me so, himself. I was very much surprised to know that it had been accepted. (Page 736.) . . .

*Senator Hitchcock.* You gave an estimate here,

as I recall it, as to the amount you would return to the Treasury if it would be acceptable on the present contract.

*Col. Lewis.* Contracts, as they actually exist, about $2,500,000.

*Senator Hitchcock.* But that requires the affirmative action of the Government to accept it?

*Col. Lewis.* As a matter of fact, Senator, I am going to give it to them whether they accept it or not. That is the point. I want to have it off my conscience and my heart.

*Senator Hitchcock.* But you would like to have some governmental acknowledgment?

*Col. Lewis.* Do you not think a postage stamp, or, as the Government can frank its mail, they might write me a letter acknowledging the receipt of it?

*Senator Hitchcock.* Has that letter been acknowledged?

*Col. Lewis.* I must say, on behalf of the Secretary of War, he has only had it a very short time, because the only reason I delayed sending it after writing it on the 11th was because I was not sure whether the War Industries Board of the Council of National Defense would acknowledge I had any rights of royalties at all, and I thought if I had nothing to give I would not give it.

*Senator Hitchcock.* They have now acknowledged it?

*Col. Lewis.* Yes, sir. All I wanted was an acknowledgment I had some rights. I have forty-three per cent of the royalties of the gun, and I give it unconditionally and perpetually to the United States

Government without any acknowledgment of any kind.

*Senator Hitchcock.* Have you any evidence that General Crozier objected to you having the Government accept these other checks you sent?

*Col. Lewis.* I have a very remarkable indorsement from General Crozier, sent to the Secretary of War, that I do not think was intended to be sent to me.

*Senator Hitchcock.* I should like to see that.

*Col. Lewis.* Senator, I would rather take out the controversial matter.

*Mr. Calfee.* I will send that to you, Senator Chamberlain, because I do not think that was ever intended for Colonel Lewis to see.

*Senator Hitchcock.* What was the substance of it?

*Col. Lewis.* I am perfectly willing to send it to you and let you judge for yourself. There are statements in that which are not true, if you want to know the fact, over the official signature.

*The Chairman.* Indorsing the Government gun?

*Col. Lewis.* No, sir; I never got such an indorsement as that.

*Senator Frelinghuysen.* How long was that check in the hands of the War Department?

*Col. Lewis.* I sent it the 16th day of February, and I only heard last week it was accepted.

*Senator Frelinghuysen.* Have you the check?

*Col. Lewis.* I think I have the canceled check in my pocketbook (producing check).

*Senator Frelinghuysen.* What is the date of the indorsement or the depositing?

*Col. Lewis.* It is in July some time, but I have never been notified. I will give you the canceled check, the certified check, on the Corn Exchange Bank, New York.

*Senator Hitchcock.* What I wanted to get at was what evidence you had that General Crozier ever really opposed accepting the check. You said quite possibly he did uphold it.

*Col. Lewis.* I will send you the indorsement.

*Senator Hitchcock.* I want it to go in the record here.

*Col. Lewis.* There are other statements in that indorsement I do not think were intended to come to me, but I am perfectly willing you shall see it and read it. I prefer that it not be made a part of a public record.

*Senator Hitchcock.* The purport of the indorsement was Crozier's opposition to accepting the check?

*Col. Lewis.* Undoubtedly; that was the only inference I could draw from it.

*Senator Hitchcock.* And it was from that indorsement you infer he opposed accepting it.

*Col. Lewis.* Yes.

*Senator McKellar.* You will furnish it to the stenographer, so that he can put it in the record, will you?

*Col. Lewis.* I would prefer not to put that in the record.

*The Chairman.* It came to you through regular channels, did it not?

*Col. Lewis.* Yes; sent by the Secretary of War.

*Senator McKellar.* Why not put it in?

*Senator Frelinghuysen.* Will you trace, for the benefit of the committee, the routine that that check has gone through? I mean when it was paid?

*Col. Lewis.* The last indorsement, I think, was June, 1914. (Page 738.)

General Wood had confirmed Colonel Lewis' statements as to the free offer of his gun, in a letter of September 19, 1916, to the Adjutant General, in the following words:

"Colonel Lewis did offer the gun to the United States Government free of all charge, not only offered it but said he hoped the Government would take it as he believed it was a good gun. He also said that he did not want to profit in any way from it as far as the use of it by the United States was concerned. This offer was made to me in my official capacity as Chief of Staff and led to an informal test of the gun at Fort Myer. General Crozier was present at this test, as was the then Secretary of War. Colonel Lewis was most anxious that the United States should have free use of his gun."

The offer referred to could not have been anything more than a statement of intention, which was not carried out, for it was not made in writing, was not followed by any piece of writing nor by any other act which would make the offer binding, and when the subject was presented to the Board of Ordnance and Fortification it was by a commercial company, as a commercial matter, with no mention

of any concession to the Government by reason of the gun having been invented by an officer of the Army. Neither Colonel Lewis nor General Wood ever said anything to the Chief of Ordnance or the Board of Ordnance and Fortification about a free offer of the gun, although General Wood afterward took part in the proceedings of the board, as president, in considering the gun. General Weaver, mentioned by Colonel Lewis as a witness of his offer to General Wood, was also a member of the Board of Ordnance and Fortification, and never mentioned to the board the free offer when the subject of the gun and the terms for which it was actually offered to the board were under discussion. If, therefore, the offer was "turned down flat," as stated by Colonel Lewis, it must have been turned down by General Wood, the friend of Col. Lewis and of the gun, for he was the only one in authority who knew anything about it and he kept the knowledge to himself.

In an effort to substantiate the charge of prejudice upon my part against himself and his inventions, Colonel Lewis gave the following testimony before the Senate Military Committee:

*Senator Frelinghuysen.* Do you feel that General Crozier's position is due to prejudice?

*Col. Lewis.* Oh, certainly.

*Senator Frelinghuysen.* Is it personal or professional?

*Col. Lewis.* I think it is both personal and professional.

*Senator Frelinghuysen.* Why is it personal?

*Col. Lewis.* It is personal simply because I, as an officer when I entered the Department and since, have made many inventions. Many of my inventions are now in the service of the United States, and in each case, so far as I recall, the introduction of these things into actual service has been over the opposition of the Ordnance Bureau.

*Senator Frelinghuysen.* What inventions are they?

*Col. Lewis.* The one that the Government is using to the greatest extent is the range and position finder. They have adopted the Lewis range and position finder throughout the coast fortifications, and in the number of letters I submitted to you is my letter giving the development of the instrument, its offer to the Government without any royalty or pay. It is my presentation to the Government.

*Senator Frelinghuysen.* We will go into that later. Has General Crozier invented anything?

*Col. Lewis.* Mechanical devices for use in the Ordnance Department; yes, the Crozier-Buffington disappearing gun-carriage.

*Senator Frelinghuysen.* Anything else?

*Col. Lewis.* I think he has been very largely interested in the development of a wire-wound gun system that is now used. Outside of that, I do not know of anything.

*Senator Frelinghuysen.* He has not invented any class of ordnance similar to yours, has he?

*Col. Lewis.* Machine guns?

*Senator Frelinghuysen.* Yes.

*Col. Lewis.* Not that I know of.

*Senator Frelinghuysen.* You have only invented the machine gun and the range finder?

*Col. Lewis.* No. I have a list there, Senator. The letter I gave you will show the list of my inventions since I have been in the military service.

*Senator Frelinghuysen.* The question I am asking you now is, whether Gen. Crozier came in competition in any invention in the Ordnance Department with you?

*Col. Lewis.* A similar invention to mine?

*Senator Frelinghuysen.* Yes.

*Col. Lewis.* Not at all, Senator; not the slightest.

*The Chairman.* Who accepted the range finder?

*Col. Lewis.* It was first recommended by the Board of Ordnance and Fortification, the old model, in 1896. The new model was subjected to very rigorous tests in New York Harbor, covering a period of six weeks, by the special board of range finding, a board appointed by the War Department to test competitively range-finding instruments. I think that was in 1907, or possibly 1908. I think the letter will give you the date.

*Senator Frelinghuysen.* Then there was no prejudice against you in the acceptance of your range finder?

*Col. Lewis.* I do not know whether the committee wants to go into that.

*Senator Hitchcock.* Was Gen. Crozier involved in it?

*Col. Lewis.* He opposed the introduction of my range finder to the bitter end.

*Senator Hitchcock.* He did not control the War Department or the Ordnance Department?

*Col. Lewis.* Not in that case. That was a special board appointed by the War Department over him, and it was adopted in spite of his opposition.

(Page 715.)

Col. Lewis invented two range and position finders which were purchased and used by the Government. The statement that I opposed the adoption of either one of them is not true. The first was developed in 1896 and the years preceding, and there is no record that he ever offered it to the Government free of charge for royalty; but there is record that he offered it for a price. With reference to a free offer of his inventions in general, there is on file in the Ordnance Office a letter relating to a certain dial telegraph, and incidentally to other devices. The letter is Ordnance Office file 4613-Enc. 48, and is as follows:

BOARD ON REGULATION OF SEACOAST ARTILLERY FIRE, Fort Wadsworth, N. Y.
May 4, 1896.

TO THE BOARD OF ORDNANCE AND FORTIFICATION,
Fort Monroe, Va.

*Gentlemen:*

. . . . . .

I would like to state further, that my only desire in bringing this telegraph before you is to aid in securing for our service the very best of each kind of instrument and device that we must necessarily use. In case you accept it, it becomes the property of the War Department absolutely and without condition so far as every military use is concerned,

and the same is true not only of this, but of every instrument or device that I may at any time submit to you.

I am, gentlemen,

Very respectfully,
Your obedient servant,
I. N. Lewis,
*First Lieut., 2d Art.*

The paragraph quoted is the only one which is here pertinent. The instrument to which the letter relates never came into extensive use, and was never purchased in quantity by the Ordnance Department; but the letter is quoted because of the general statement of intention at the end of it, which Col. Lewis would evidently like to have understood as indicating his attitude toward the Government with reference to his inventions. The intention, however, like that with reference to the gun, was never carried out, as is evidenced by the following. With regard to the first range finder, Col. Lewis wrote this letter to the War Department:

4613 Enc. 83

Fort Wadsworth, N. Y. H.,
Nov. 23, 1896.

To the Adjutant General, U. S. Army,
Washington, D. C.

*Sir:*

I have the honor to respectfully submit for the consideration of the Secretary of War, and for such action as he may deem proper, the following with respect to my range and position finder:

The fact is well known to the Department that during the past eight years I have developed

practically and invented a range and position finder for seacoast artillery use which has been subjected to the most thorough service tests for a period of more than three years, and which, as the result of those tests has been officially adopted by the Board of Ordnance and Fortification as the service range finder for U. S. Artillery with the recommendation that the necessary steps be taken to acquire the right to use this instrument upon such terms or at such a rate of compensation as may to the Secretary of War seem just and equitable.

The result of the tests made shows that not only does the instrument meet every requirement of a modern artillery service in the most satisfactory manner, but that it is also the most reliable and accurate of its kind in the world to-day. There is, in fact, no other instrument of American origin that even approximately fulfills service requirements.

Believing, as I do, that it forms a most important element in the artillery defence of our coast, I want my own Government to have the first opportunity to purchase my rights in the invention, and I wish to dispose of those rights on terms that are fair and equitable.

I own absolutely in my own name all the rights, and have never at any time parted either directly or indirectly with the whole or any part of the invention; I am therefore in a position to assign all patent and other rights, to turn over all the confidential data of construction, and to furnish complete working drawings to the Government in case of purchase.

I would respectfully submit the following distinct propositions which I believe to be fair and reasonable, viz.:

First. I will sell all rights in the invention for the United States alone, leaving me free to negotiate

for the sale of the rights for foreign countries, for the sum of fifty thousand dollars ($50,000).

Second. I will sell all rights in the invention absolutely and exclusively for the sum of seventy-five thousand dollars ($75,000).

Inasmuch as I have already waited long and patiently for the Department to take some definite action in regard to the purchase of my invention, and in view of the fact that I have already had overtures from two foreign governments, and a direct offer of purchase for the rights from a well established and thoroughly reputable American company, I would respectfully ask to be informed as soon as possible of the decision of the Secretary of War.

I am, General,

Very respectfully,
Your obedient servant,
I. N. Lewis,
*1st Lieut. 2d U. S. Art.*

This offer, which it is seen was made about six months after the general statement of intention in the letter quoted just above, was not accepted; but another effort was made to secure payment from the Government for the invention, through the action of Congress. The following letter was addressed to the Secretary of War by the Chairman of the Committee on Military Affairs of the Senate:

4613 Enc. 88

United States Senate,
Washington, February 1, 1897.

*Dear Sir:*

Senator Chandler offers an amendment to be proposed to the Fortifications Appropriation Bill, appropriating $100,000 for the purchase of all

rights in the Lewis range finder. The proposed amendment was referred to the Committee on Coast Defenses, of which I am Acting Chairman, in the absence of Senator Squire.

So far as I have canvassed the committee all are in favor of it except one, and he makes a suggestion which I submit to the Department. This gentleman has visited Sandy Hook and seen the range finder tested and admired it; but he says that great ingenuity is being exercised in that direction and in view of the possibility that some better range finder may be found we ought to authorize the War Department to buy ten, twenty, thirty or forty range finders, as they may be needed, and wait awhile, and ultimately, if it be necessary and nothing better is discovered, buy the patent.

I shall be glad of some expression from the War Department or the Ordnance Bureau on this criticism. I think the Committee is disposed to report the amendment favorably.

Yours truly,

J. R. HAWLEY.

HON. D. S. LAMONT, *Secretary of War.*

P. S. If a note can be mailed to me this afternoon I should be glad to get it in the morning.

The letter was answered by the Chief of Ordnance on the following day. The answer is below:

4613. Enc. 88.

OFFICE OF THE CHIEF OF ORDNANCE,
Washington, D. C., Feb. 2, 1897.

HON. JOS. R. HAWLEY, U. S. Senate,
Washington, D. C.

*Sir:*

Your letter of the 1st instant, addressed to the Secretary of War, in regard to the Lewis range finder, has been referred to me for reply.

This department has purchased a limited number of the Lewis range finders, and in accordance with the recommendations of boards that investigated the matter, has issued these range finders to posts for actual trial in service. Unless an extraordinary emergency should arise it is not the intention to purchase more range finders until those in use have been tried. In the meantime other range finders are under consideration, it is not impossible that a better range finder may be obtained, and under all the circumstances it would not, in my judgment, be wise for the United States to incur the expense of purchasing all rights in the Lewis range finder.

Respectfully,

(Signed) D. W. Flagler,
*Brig.-Gen., Chief of Ordnance.*

Since these letters were written Col. Lewis has manifested continued hostility to the Ordnance Department, and has freely made against it his charges of unfair treatment. I had at the time nothing to do with the subject in which he was interested, being a subordinate officer of the Ordnance Department engaged on other duties.

On March 15th, following the correspondence with Senator Hawley, an order was given for one hundred Lewis range finders at a price of $1,500 each. The purchase was made from a commercial company, and in it there was no proposition or mention of reduction of price because of relief from royalty charge. The royalty, if any, was taken care of in the purchase price. (O. O. file 4613-Enc. 140.)

The invention in which the rights were thus offered for sale to the Government by Col. Lewis had been developed with the aid of public funds

allotted for the purpose by the Board of Ordnance and Fortification. The various allotments were as follows:

August, 1890, $2,885 (O. O. file 4973/1890).
September 22, 1890, $200 (O. O. file 6619/01).
May 3, 1892, $3,000 (O. O. file 2345/92).
January 24, 1893, $95 (O. O. file 606/93).
September 6, 1893, $250 (O. O. file 706-B/93).
On letter of September 29, 1894, $44.75 (O. O. file 4613-Enc. 83).
November 20, 1894, $2,000 (O. O. file 4613-Enc. 88), increased later by $500 (O. O. file 4613-Enc. 2).
October, 1895, $550 (O. O. file 4613-Encs. 7 and 8).

The Lewis range and position finder was later superseded by another invention which remained the adopted type until about 1908, when Col. Lewis submitted his second instrument. The second range finder was considered by the Board of Ordnance and Fortification, of which I was then a member, and it was pursuant to action of that board that it was subjected to a test by a special board, and was adopted as a result of the test. I took part and concurred in the proceedings leading to the test and to the adoption. The history can be found in the record of proceedings of the Board.

Following its adoption something like two hundred thousand dollars' worth of the second range finders were bought by the Ordnance Department. Like the first range finders they were bought from private parties, with no known reduction of price because of relief of the Government from the payment of royalty. What the relations are between Col. Lewis and the parties selling these inventions

to the Government, and what consideration, if any, was paid to him for the control of his patents for range finders, has never been stated by Col. Lewis or otherwise disclosed, to my knowledge. He has never entered into a written engagement in regard to them, such as his letter of December 11, 1917, to the Secretary of War, quoted in his testimony above in regard to his gun, nor has he ever paid to the Government any sums of money representing receipts by him for these inventions; of which the last is still the standard model of range finder, and therefore subject to further purchase.

After the adoption of his gun by the British Government, and after a large number had been manufactured, Col. Lewis took the first effective step towards making good his stated intention of foregoing profit from his inventions used by the United States by enclosing his check for something over $10,000 in his letter of February 16, 1917, to the Secretary of War, as described in his testimony. As he stated that the check was never acknowledged, and that I advised strongly against its acceptance, the story of the transaction as revealed by the correspondence may be of some interest. Colonel Lewis' letter is as follows:

O72.62-Inc. 3.

1 Russell Terrace, Montclair, N. J.
February 16, 1917.

The Honorable the Secretary of War,
Washington, D. C.

*Sir:*

Since my return from abroad on the 1st instant,

I have received a complete statement of moneys due and paid to me during the year ended December 31, 1916, by the Savage Arms Company of Utica, New York, as royalties on the American manufacture of Lewis guns, spare parts and accessories.

Included in the statement referred to is the sum of ten thousand eight hundred and eighty-nine dollars and seventeen cents paid to me as royalties on three hundred and fifty-three Lewis guns (with spare parts), manufactured originally under contract with the Canadian Government but actually delivered to and paid for by the United States War Department.

During our personal interview in your office in June, 1916, about the time of the delivery of these three hundred and fifty-three guns, I informed you that I had repeatedly offered my interest in my machine-gun invention to my own Government, without thought of pecuniary recompense, long before undertaking the development and introduction of the gun abroad; notwithstanding the fact that I had never received the slightest assistance or encouragement in the practical development of my inventions from anyone connected with the United States Ordnance Department.

I feel a moral obligation to refuse to profit to the extent of one penny from the sale of the above-mentioned guns to the War Department, and I therefore enclose herewith my certified check on the Corn Exchange Bank of New York, payable to your order, for ten thousand eight hundred and eighty-nine dollars and seventeen cents, with the request that you deposit the same to the credit of the United States Government.

Very respectfully,
Your obedient servant,
ISAAC N. LEWIS,
*Col., U. S. Army (retired).*

The check was apparently sent to the Secretary of the Treasury on March 2nd, and raised a doubt in the mind of that officer whether it should be accepted. He therefore returned it to the Secretary of War with the following letter:

072.4/62 Inc. 2

TREASURY DEPARTMENT,
Washington, April 14, 1917.

MY DEAR MR. SECRETARY:

Referring to your letter of March 2nd, with which you transmit a check of Isaac N. Lewis, in the sum of $10,889.17, drawn to the order of the Secretary of War and by you endorsed to the Secretary of the Treasury, it is noted that Isaac N. Lewis, the drawer of the check, is a retired officer of the United States Army and the inventor of a machine gun; that the gun is manufactured by the Savage Arms Company and that Lewis receives a royalty therefrom; that the sum of $10,889.17 represents the royalty received by Lewis from the said company for the sale of the guns in question to the War Department; and that Lewis feels a moral obligation to refuse to profit to the extent of one penny from the sale of the guns to the Government, and for that reason transmits the check representing the amount of the profit with the request that it be deposited to the credit of the United States Government.

The amount tendered and offered by Lewis appears to be offered as a gift or donation on his part to the United States and as it is apparently offered without any condition or qualification whatever, the same may be legally accepted.

However, as it appears from your letter of March 2nd that the Savage Arms Company, the corporation which paid the royalties to Col. Lewis, is

constantly competing for orders before your Department, in the last analysis the question of accepting this donation would seem to be a proper one for the War Department to determine.

The correspondence and certified check are returned herewith.

Very truly yours,
W. G. McAdoo,
*Secretary.*

To Honorable the Secretary of War.

Upon receiving the check back the Secretary of War sent the correspondence to me with the memorandum below, and I returned it to him with the one which follows:

072.4/68

War Department,
April 18, 1917.

Memorandum for the Chief of Ordnance:

Subject: Letter from Secretary of the Treasury, April 14, returning check for $10,889.17 from Col. Isaac N. Lewis.

Will Gen. Crozier kindly give me his opinion in the matter of the acceptance of the enclosed gift? I am inclined to request the Secretary of the Treasury to deposit this fund to the credit of the United States as a gift, and yet I do not want to embarrass the Ordnance Department in its dealings with the Savage Arms Company.

Baker,
*Secretary of War.*

072.4/68

OFFICE OF THE CHIEF OF ORDNANCE,
Washington, April 24, 1917.

Memorandum for the Secretary of War:

Subject: Acceptance of check from Col. Lewis covering royalties on machine guns.

I do not think that the acceptance of this check would embarrass the Ordnance Department in its dealings with the Savage Arms Company with reference to the Lewis gun. If Col. Lewis wishes to treat further purchases made and to be made of Lewis guns from the Savage Arms Company in a similar manner and shall notify the War Department of his intention, the resulting advantage in cost to the Government of the Lewis gun must be considered when negotiations for machine guns of like character are under way. If he shall not give any such notice of intention, nor transfer to the United States his right to royalties on guns manufactured for the United States, the price at which guns may be offered by the Savage Arms Company will, of course, be considered at the figure which the company gives.

There are, however, some other features accompanying the offer of this check by Col. Lewis which I think should be taken into consideration in reaching a conclusion as to its acceptance. In his accompanying letter dated February 16, 1917, he states to the Secretary of War:

"I informed you that I had repeatedly offered my interest in my machine gun inventions to my own government, without thought of pecuniary recompense, long before undertaking the development and introduction of the gun abroad."

Col. Lewis never offered either to this Department or to the Board of Ordnance and Fortifica-

tion, which are the agencies established for the consideration of the machine gun supply of the United States, his interest in his machine gun inventions. There is no record of any such offer as he claims to have made, and the first gun which he presented to either the Ordnance Department or the Board of Ordnance and Fortification was offered for consideration as a commercial matter, and had itself been manufactured abroad.

He further states in his letter enclosing his check:

"I have never received the slightest assistance or encouragement in the practical development of my inventions from any one connected with the United States Ordnance Department."

Col. Lewis never asked the assistance of the Ordnance Department in the development of his inventions. If the inventions had been developed with the aid of the United States Government Col. Lewis would have lost the right to royalties for their use by the Government. The Government has tested several of his inventions quite extensively, at considerable expense, and the tests were probably useful in the development of the inventions; but it has done as much for many other inventors. The Act of June 25, 1910, giving additional protection to owners of patents of the United States, grants the right of suit against the United States for compensation for the use of inventions, and provides further—

"That the benefits of this Act shall not inure to anybody who, when he makes such claim, is in the employment or service of the Government of the United States, or the assignee of any such patent; nor shall this Act apply to any device discovered or invented by such employee during the time of his employment or service."

Col. Lewis further states:

"I feel a moral obligation to refuse to profit to the extent of one penny from the sale of the above-mentioned guns to the War Department."

The Ordnance Department has made considerable purchases of two other articles invented by Col. Lewis, namely, range finders, aggregating in cost something like $350,000. These articles, like the machine gun, were invented by Col. Lewis while in active service in the Coast Artillery. His range finders have been purchased from private parties, and the Government has been given no advantage, in purchase price or otherwise, by reason of the range finders having been invented and patented by Col. Lewis. In connection with the development of the first there were allotted by the Board of Ordnance and Fortification sums aggregating approximately $10,000.

I think that the effect of the acceptance of Col. Lewis' check in operating as an endorsement of his statements and position in regard to the use of his inventions by the Government should be taken into consideration in determining whether or not it should be accepted, if any discretion exists in the matter.

(Signed) William Crozier,
*Brig.-Gen., Chief of Ordnance, U. S. A.*

The last paragraph of my memorandum was intended to induce reflection before accepting the check, for the reason stated. It was this memorandum which Col. Lewis, as stated in his testimony, was so averse from having appear in the record. I can understand why he would not like to have it appear, but I put it in the record myself a few days afterward.

Shortly after the receipt of my memorandum the Secretary of War sent it to Col. Lewis with the following letter:

072.4/70

WAR DEPARTMENT,
Washington, D. C., April 29, 1917.

MY DEAR COLONEL LEWIS:

On February 16th you wrote me a letter and sent me a certified check on the Corn Exchange Bank of New York for $10,889.17, with request that I deposit same to the credit of the Government of the United States.

In your letter you state that this sum was the amount received by you from royalties on three hundred and fifty-three Lewis machine guns with spare parts manufactured largely under contract with the Canadian Government but actually delivered to, and paid for by, the United States Government through the War Department. In my office in June, 1916, you informed me that you had repeatedly offered your interest in your machine gun inventions to the Government of the United States without thought of pecuniary recompense, and that you felt a moral obligation to refuse to profit to the extent of one penny on the sale of such guns to the War Department.

In view of the fact that your letter contains several statements which have from time to time been the basis of controversy I deem it wise to hand you herewith copy of memorandum from the Chief of Ordnance, to whom I referred the question of accepting this check, and also as to whether its acceptance would embarrass the Ordnance Department in subsequent dealings with the Savage Arms Company in purchasing further supplies of the Lewis gun.

I do not send you the attached memorandum to invite further comment on the controversial portions either of your letter or that of the Chief of Ordnance, but merely to have it understood that the acceptance of this check by the Government is not to be considered as a determination by me of any of these ancient matters of controversy.

If you do not care to have this money deposited in the Treasury of the United States simply on the ground stated in your original letter and without understanding that I am now examining or undertaking to determine any controversial question as to the breach of relations between you and the War Department, or any branch or division of it, I shall of course be glad to accept the check on behalf of the Government.

I shall hold the check until I have your reply.

I ask your particular attention to the suggestion made by Gen. Crozier with regard to the purchase of certain Lewis guns from the Savage Arms Company, in order that this department may be advised in undertaking future purchases.

Very sincerely yours,

NEWTON D. BAKER,
*Secretary of War.*

COL. ISAAC N. LEWIS,
1 Russell Terrace,
Montclair, N. J.

In view of the frequent reference in this letter to my memorandum to the Secretary of War, enclosed with it, it is not easy to understand the statement of Col. Lewis and Mr. Calfee that they did not think it was intended to be seen by Col. Lewis. (Page 150.) Col. Lewis' reply to the Secretary came to me, and I returned it with a memorandum that

I saw no objection to the acceptance of the check; which was then sent to the Treasury Department and deposited as a donation to the Government. Col. Lewis' reply, my memorandum and the letter of the Assistant Secretary of the Treasury telling of the final disposition of the check are below:

072.4/73

No. 1 Russell Terrace,
Montclair, N. J.,
May 12, 1917.

THE HONORABLE THE SECRETARY OF WAR,
Washington, D. C.

MY DEAR MR. SECRETARY:

Your letter of April 29th, with its enclosed memorandum from the Chief of Ordnance, has been received and very carefully considered.

I *do* care to have the money represented by the check sent you in my letter of February 16, 1917, deposited in the Treasury of the United States simply on the ground stated in my original letter, without any understanding that you are now examining or undertaking to determine any controversial question as to the breach of relations between me and the War Department, or any branch or division of it, and I now have the honor to request again that you so accept and deposit it.

My letter of February 16, 1917, was sent you solely for the reason stated therein, and for no other.

I can see no possible embarrassment to the War Department nor to the Ordnance Department, in the acceptance of my check. It is possible, however, that your acceptance and deposit of the check may embarrass the present Chief of Ordnance personally.

The memorandum from the Chief of Ordnance to

which you invited my attention is so widely at variance with what I know from personal knowledge to be the facts in the case, that I cannot fairly consider any of the questions raised by Gen. Crozier therein without controversy, and I understand it to be your wish and direction that there be no further controversy.

In the present very grave national emergency, I am directly instrumental in supplying, delivering and putting on the actual firing lines against the fighting enemies of my country more machine guns each week than the present Chief of Ordnance has supplied for the use of our own army of defence during the whole of the fourteen years that he has been in office. I have done, and am doing, this without one penny of assistance and without one word of encouragement or acknowledgment from any one connected with the Ordnance Department, and in spite of the long continued and active opposition of that Department.

I am therefore content to now rest the matter with you simply as a personal appeal for justice.

Very respectfully,
Your obedient servant,
(Signed) I. N. Lewis,
*Colonel, U. S. Army, Retired.*

072.4/86

Office of the Chief of Ordnance,
War Department, June 4, 1917.

Memorandum for the Secretary of War:

Subject: Acceptance and deposit of check from Col. Lewis returning royalties.

I do not see any objection to the acceptance and deposit of Col. Lewis' check for $10,889.17 in accordance with the letter of May 12, 1917 (O. O. file 072.4/73), in reply to one from the Secretary of War

of April 29th (O. O. file 072.4/70), in view of the reservations made in the last-mentioned letter concerning the determination of the matters in controversy.

(Signed) WILLIAM CROZIER,
*Brig.-Gen., Chief of Ordnance, U. S. A.*

072.4/92

TREASURY DEPARTMENT,
Washington, June 18, 1917.

MY DEAR MR. SECRETARY:

I have the honor to acknowledge the receipt of your letter dated 7th instant, with its enclosures, including check No. Special 692, drawn February 16, 1917, by Isaac N. Lewis, on the Corn Exchange Bank, New York, in your favor for $10,889.17, endorsed by you to the order of the Secretary of the Treasury.

The check has been collected and, as requested, its amount has been deposited in the United States Treasury in the name of Isaac N. Lewis, Colonel U. S. Army, retired, on account of "Donation to the Government," as shown by enclosed duplicate certificate of deposit No. 6802 issued therefor on June 15th by the Treasurer of the United States.

The correspondence which accompanied your letter is herewith returned for the files of your Department.

Respectfully,
(Signed) OSCAR T. CROSBY,
*Assistant Secretary.*

The Honorable the Secretary of War.

A reason seems needed for Col. Lewis' change of procedure, and his final determination to carry out his intention of release of the Government from payment for his inventions, which he had been express-

ing for so many years without carrying them out. Perhaps the reason may be found in his changed circumstances. He testified before the Senate Military Committee that at that time, in December, 1917, over 70,000 of his machine guns had been manufactured for the European armies. I do not know what royalty he received on these guns, but if the rate was the same as stated for the 40,000 machine guns, ordered by the United States, in his letter of December 11, 1917, quoted on page 141, and if the proportion of spare parts to guns was the same, the total of the royalty must have been a large sum. He further testified that, at the same time, the manufacture of his gun was going on at the rate of over 2,000 per week, of which less than 500 could have been for the United States. He was, therefore, receiving royalty, apparently, for 1,500 or more per week. At the rate indicated in his above cited letter, his continuing income from the manufacture of guns must also have been very large. I do not see any objection to the receipt by Col. Lewis of these large sums; but I do see objection to his effort to accentuate his unfounded charge of unfair treatment by the Ordnance Department and its head with the allegation that the treatment was in face of his desire to spare the Government expense, which he never took any steps to carry out until he could well afford to do so.

In the early autumn of 1916 a particularly energetic newspaper assault was made upon the Ordnance Department and myself for the unfairness which we were alleged to have exhibited toward Col.

Lewis and the Lewis gun. A great metropolitan daily considered the matter of enough importance to devote a column of the first page and all the reading matter of the fourth page of one issue, and an editorial, to its presentation; and the charges made were widely printed in other journals throughout the country. I made a short reply in the first mentioned paper, which manifested a fair disposition to print both sides, and in addition I took up the subject with the Secretary of War, urging that the matter was not simply one of a controversy between two officers, but was another instance of a long series of charges against an executive department of the Government and its subordinate bureau, made now, however, by an officer whose status on the retired list of the army rendered him subject to call to account through the processes of military discipline. I represented that we who were temporarily at the head of these departments had not only our own reputations to look after, but had the good name of the departments in our custody, and that it was our duty to vindicate the latter when it was assailed by persons who could be made responsible, particularly when, as in the present instance, the assault was against both ourselves and our predecessors in office.

Gen. Leonard Wood, on the other side, also brought the matter to the attention of the Secretary of War in a letter objecting to the manner in which my reply in the metropolitan daily had spoken of his machine gun test at Plattsburg, which was not

complimentary, and requested action in accordance with his views.

The Secretary referred the matter to the Inspector General for examination and report, and that officer handed his report to the Chief of Staff on October 12, 1916. After reviewing the case his conclusions were as follows:

"56. The essential questions of fact raised by this correspondence are:

(a) Whether the test at Plattsburg was an informal one.

*By the Inspector General:* In my opinion the test was informal.

(b) Whether the Benet-Mercié guns submitted to the test were in fit condition.

*By the Inspector General:* The proceedings of the Board do not show that it, as a Board, made any examination of the Benet-Mercié gun, but do show that Lieut. Gordon, commanding the Machine Gun Troop from which the guns were received to test, stated that they were in the best possible condition.

Gen. Wood states in his letter: . . . "Lieut. Gordon is thoroughly familiar with the Benet-Mercié gun, skilled in its use, and reported his guns in perfect condition." . . .

In reply to this, Gen. Crozier states: . . . "The parties interested in one of the competing guns, only, received notification and were represented at the test. They presented their guns with all the assurance of proper condition to enter the test and of proper handling during the test which would naturally result from the presentation of a gun by its manufacturers. The Benet-Mercié gun was presented and looked after by the class of personnel which has, in the service, so often failed to get

good results from the gun by reason of unskillful care and handling, whose statement therefore that the guns were in the best possible condition naturally would not be accepted by any one interested in the guns." . . .

*By the Inspector General:* In my opinion this is a fair statement of the case.

*Note:* On July 5, 1916, the United States Ordnance Company, as attorney and agent for Messrs. Benet and Mercié, requested information from the Secretary of War as to the comparative tests as reported in the public press to have been conducted at the Plattsburg camp with the Benet-Mercié automatic rifle, stating that they had no knowledge that such tests were contemplated and requesting information as to whether they were conducted under official authority of the War Department.

57. On September 18, 1916, Gen. Crozier wrote a letter to the New York *Times,* in reply to a long article and editorial published in that paper on that date, on the subject of the Lewis gun and its relation with the Ordnance Department, in which he used the following language: . . . "In the so-called Plattsburg test none of the safeguards of thoroughness or fairness was present. A small number of rounds, only, was fired, which did not include the essential endurance test. No responsible officer would have been justified in basing conclusions upon its results." . . .

58. On September 19, 1916, Major-Gen. Leonard Wood inclosed this extract to the Adjutant-General of the Army and raised questions of fact as to the statement that none of the safeguards of thoroughness or fairness was present in the test referred to, alleging the statement to be contrary to fact, wholly unwarranted and tending to misrepresent the test.

59. *By the Inspector General:* The Inspector

thinks that the difference of opinion between Gen. Wood and Gen. Crozier with respect to the character of the test of the Lewis gun at Plattsburg Barracks arises from a difference of point of view rather than involving questions of fact.

As above stated, the Board of Ordnance and Fortification had determined a program of tests to which this Lewis gun should be subjected, which program, by the way, had been approved by Gen. Wood as President of the Board of Ordnance and Fortification, and also by the Secretary of War.

Undoubtedly, Gen. Crozier had such a test in mind when interpreting the test at Plattsburg, while Gen. Wood, now commanding the Eastern Department, had abandoned the program prescribed by the Board of Ordnance and Fortification and substituted one of his own.

While I think Gen. Crozier made a mistake in entering the controversy over the Lewis gun in the press, I must admit that there was strong provocation in the article and editorial thereon published in the New York *Times* of September 18, 1916, principally in that it placed the responsibility for the rejection of the Lewis gun upon Gen. Crozier and the Ordnance Department, whereas, every action with respect to this gun and its rejection had been conducted under the direction of the Board of Ordnance and Fortification, with the approval of the Secretary of War; and all tests of the gun had been made by a board convened by direction of the Secretary of War, on which there was only one ordnance officer.

GENERAL CONCLUSIONS.

60. My general conclusions, as developed from an examination of the records, are:

(a) There is no official record that Col. Lewis ever offered a gun of his invention, through any

individual or through the Board of Ordnance and Fortification, to the United States Government, free or at a price.

(b) The first and only offer of the gun to the Government, of record, was made by a representative of the Automatic Arms Company, on September 2, 1913, to the Chief of Ordnance—One hundred guns, complete, at not to exceed $1,000 each, and to license the Ordnance Department to manufacture, use and sell such guns in the United States for a royalty of not to exceed $150 per gun.

(c) Such tests as the Lewis gun has been subjected to, have been under a program authorized by the Board of Ordnance and Fortification and approved by the Secretary of War, and were made by boards of officers named in orders from the Adjutant-General's Office—one officer of the Ordnance Department on each board.

(d) The Savage Arms Company, through its President, in a letter to the Chief of Ordnance with reference to the test conducted in April, 1916, stated: "The Company feels that the investigation has been entirely impartial and regards the Board as one very capable of judging the value of the investigation to the Ordnance Department. We also appreciate the courtesy shown us by Col. Peirce and his assistants."

(e) The proceedings of the boards which tested the rifle have been, in each case, duly approved by the Secretary of War.

(f) Whatever responsibility attaches to the condemnation of this gun as a service gun belongs to the War Department and not to the Chief of Ordnance nor to the Ordnance Department.

(g) The test ordered by the Commanding General, Eastern Department, at Plattsburg, N. Y., in June, 1916, was unauthorized and improper.

(h) The controversy over the Plattsburg test arose through the fact that the owners of the Lewis gun had previously submitted it for two tests to boards convened by the War Department, under a program approved by the Board of Ordnance and Fortification and it had failed to pass what is known as the Arsenal or endurance test, thereby losing its right to the field test proposed by the program of the Board of Ordnance and Fortification, or to any test not authorized by the War Department.

(i) The records do not show any hostility on the part of Gen. Crozier or the Ordnance Department to the Lewis gun, but do show that the Department, by direction of its Chief, afforded the owners of this gun every reasonable facility in placing it before the testing board at the Springfield Armory.

(j) The Secretary of War should direct each of the officers concerned in this controversy to drop it, as no good purpose can be subserved by continuing such a controversy, which really does not involve questions of fact, but the value of opinion as to the character of test to which this gun was subjected at Plattsburg.

E. A. Garlington,
*Inspector General.*

In the body of the report there had occurred the following:

"*Note:* It will be observed that the Ordnance Department furnished the Automatic Arms Company every facility with respect to the manufacture of this gun for test."

After the submission of the Inspector General's report, the Secretary of War issued a press bulletin in which, after summarizing the subject, he stated:

"The Inspector General of the Army was ordered to investigate the other aspects of the case. He has now done so, and his general conclusions are as follows: The "General Conclusions" were then given, except that conclusion (g) was omitted, and for conclusion (j) was substituted the following: "The controversy which has arisen does not involve questions of fact, merely the value of opinion as to the character of test to which this gun was subjected at Plattsburg. The Secretary of War has approved these conclusions of the Inspector General and, in accordance with the latter's recommendation, has directed the controversy to cease."

It can be noted that in thus disposing of the case the Secretary of War found that the Ordnance Department had acted without hostility and in accordance with its duty toward the Lewis gun, but he failed to take any disciplinary or otherwise remedial action against the officer who had published the contrary, and he placed all concerned on an equality in directing that the controversy should cease. I felt that this action did not conclusively dispose of the matter, principally in that it did not follow formal proceedings in which both sides would appear together, such as are held by a court, preceding announced conclusions, and I urged upon the Secretary that the matter had reached such a stage that nothing less than such proceedings would serve to set it at rest, and meet the sentiment of angry criticism of the Ordnance Department which had been aroused in the public mind. He replied that Col. Lewis was not satisfied either, and had made the

complaint appearing in his letter of December 11, 1917, quoted in his testimony on page 141, and added that he intended to offer him a court of inquiry in order to afford full opportunity for the presentation and examination of his grievance. The offer of a court of inquiry was made to Col. Lewis, and was declined by him; whereupon I myself applied for such a court in the following letter:

War Department,
Office of the War Council,
Washington, D. C., January 6, 1918.

From: Major-Gen. William Crozier, Chief of Ordnance.

To: The Adjutant-General of the Army.

Subject: Request for appointment of a court of inquiry.

1. Charge having been publicly made by Col. I. N. Lewis, U. S. A. (retired), to the effect that the Ordnance Department, and I as Chief of Ordnance, have failed to accord proper consideration to his invention of a machine gun, and that the service has thereby been deprived of a much-needed supply of machine guns, and this charge having been repeated in the testimony of Col. Lewis before the Senate Committee on Military Affairs on December 22, 1917, together with the further charge that I opposed the adoption for use in the service of certain range finders invented by Col. Lewis, and these charges having been made to appear more serious through the allegation that the use of the inventions mentioned had been offered to the United States free of charge for compensation to the inventor, and the charges having received wide circulation, with danger of impairment of the confidence

of the Country in the manner in which the operations confided to the Ordnance Department have been carried on, I request that a Court of Inquiry be appointed to examine into the nature of all of the transactions referred to in the above-mentioned charges, and into all the relations between the said Col. Lewis and the Ordnance Department or the Chief of Ordnance in so far as they concern these charges and the interests of the service, and that the Court be directed to state, in addition to its conclusions of fact, its opinion concerning the transactions inquired into and the conduct of the officers involved in them, and to recommend what further steps should be taken in the premises.

WILLIAM CROZIER.

The Secretary of War had a conversation with Senator Chamberlain, Chairman of the Committee on Military Affairs, on the subject of this application for a court, as a result of which he sent the Senator the following letter:

January 7, 1918.

MY DEAR SENATOR CHAMBERLAIN:

I enclose you a copy of a letter from Gen. Crozier, which I found on my desk to-day after my return from the Capitol. The General had suggested to me his purpose, but I did not know that he intended to follow it up with a formal request.

This request is made under the provision of Article 97 of the Articles of War, which reads as follows:

> A Court of Inquiry to examine into the nature of any transaction of or accusation or imputation against any officer or soldier may be ordered by the President or by any commanding officer; but a Court of Inquiry shall not

be ordered by any commanding officer except upon the request of the officer or soldier whose conduct is to be inquired into.

As I stated to you to-day in our conversation, Gen. Crozier feels that by reason of the Lewis machine gun controversy his life-long service to the country and his reputation as an officer and as a man have been brought into discredit. As he stated to you and to me, he feels that one side of this controversy has had access to widespread newspaper publicity while the other was restrained by those considerations of discipline and propriety which prevent Army officers from indulging in newspaper controversies with regard to the business of the service. As a consequence, he feels that the country has reached an opinion on this subject to the effect that he has been unjust to Col. Lewis and to his invention, slow in recognizing the merits of a good weapon, and prejudiced in his treatment of the weapon and its inventor, all of which he earnestly denies and yet feels himself unable to effectively follow the accusation with his denial or by any act which is within his power to change an erroneous public opinion against him. I am deeply impressed with Gen. Crozier's feeling. His confirmation is now pending before the Senate. He is nearly sixty-three years old and has been in the Army since his graduation from West Point in 1876, in all forty-one years. Whatever reputation he has he has made as an officer in the Army, and I can testify that at least for the two years during which he has been under my observation his industry has been indefatigable and his zeal fervent and single-minded for the good of the service. Indeed, I think I know of no public servant who spends more hours in or has fewer interests apart from the service than Gen. Crozier.

I have myself endeavored twice to examine this machine gun controversy, feeling that I was without any other interest than that which a judge ought properly to have in determining a controversy, and each time I have come away with the feeling that Gen. Crozier had acted not only upon the best motives, but upon a sound discretion and reasoned judgment. I am not saying this to affect in the least the ultimate determination of the question now presented, but only because it seems to me that in justice an officer of such service and such present loyalty and zeal is entitled to any protection for his reputation which the rules of his profession accord him.

I have two embarrassments about the request which Gen. Crozier has presented. One arises from the fact that the Government needs at this time its capable officers in other service, and I should hesitate to detail three or five officers of sufficient experience and judgment to constitute this Court. This difficulty, however, I can meet by asking the President of the American Bar Association to name a competent number of the most distinguished lawyers in the country who would be willing to accept National Army Commissions and thus become officers long enough to be constituted into this Court, make the necessary inquiry and report their findings, and this I should undoubtedly do were it not for the fact that this controversy is at least a part of the subject-matter which the Committee on Military Affairs of the Senate is now considering, and I realize that there might be some embarrassment to the Committee if such a Court were appointed to prosecute this inquiry while the Committee itself is considering the matter.

If I could make a suggestion in the matter, it would be that the Committee hold Gen. Crozier's

nomination in abeyance until after the report of the Court of Inquiry, which I would in every possible way urge to speedy deliverance. I do not think this action would necessarily affect any recommendations which the Committee may desire to make growing out of its present inquiry, and so there would be avoided the appearance of an attempt either to influence or anticipate the action of the Committee by the appointment of the Court. You were good enough to say to-day that you would lay this matter before your associates on the Committee in executive session and give me the benefit of their views. I will be very grateful if you would do so at your early convenience.

Cordially yours,

NEWTON D. BAKER,
*Secretary of War.*

HON. GEO. E. CHAMBERLAIN,
*United States Senate.*

On the next day he sent me a copy of this letter with a note as follows:

THE SECRETARY OF WAR,
Washington, D. C.
January 8, 1918.

MY DEAR GEN. CROZIER:

I had a talk yesterday with Senator Chamberlain and, as a result, sent him a letter of which the enclosed is a copy.

The Senator's suggestion with regard to the possibility of our offending the Committee by appearing to disregard their conclusions was a new thought to me. I do not want to make matters worse, to say the least.

Cordially yours,
NEWTON D. BAKER.

I do not know what response the Secretary's letter to Senator Chamberlain met with, but a few days

after the receipt of his note I said to the Secretary that I still thought that the court should be held and earnestly requested him to appoint it. I found him then very averse from taking such action, on the ground that it would be unwise because of its possible effect upon the Committee; and was advised by him to leave the matter in his hands, when he would see that justice should be done both to the Ordnance Department and to myself, and that the subject should be made to appear in the proper light. I had in the meantime been relieved from my duties as Chief of Ordnance and assigned as a member of the newly formed War Council, and was under orders to make a visit to Europe to secure information in regard to the conduct of the war. I had not wanted to be relieved as Chief of Ordnance; first because I wished to carry through the great war the department which a devoted personnel had brought to its existing stage of efficiency during my sixteen years' service as its head, and second because I felt that my relief would imply the admission by the War Department of justification for the criticism which had been directed against the Ordnance Department, when the unpreparedness which the department had for years been warning against began to be appreciated by Congress and the country. But I was assured by the Secretary that the sole reason for my relief was that my services might be availed of on the highly important Council which had been formed, and I accepted the assurance, though with reluctance at leaving my department; and was then very anxious to get into

the theater of war. I therefore acted upon the Secretary's advice that I should not press the matter of the court of inquiry, with its resultant delay, and sailed for Europe.

When the war was over, and most of the troops had returned from Europe, so that there were plenty of officers of suitable rank available for duty upon a court of inquiry, I renewed my effort to obtain such a court, and upon August 16, 1919, addressed a letter to the Adjutant-General. In this letter I gave quotations from the testimony of Col. Lewis before the Senate Military Committee, which contained erroneous presentation of facts, and were also aspersions upon the Chief of Ordnance. I added that I wished to avail myself of the method provided by the military code for securing a judicial examination of the charges made and expression of opinion upon the conduct of all officers concerned.

I received from the Adjutant-General the reply of the Secretary of War, dated September 10, 1919, as follows:

War Department
The Adjutant General's Office
Washington, Sept. 10, 1919.

From: The Adjutant General of the Army.

To: Major General William Crozier, U. S. Army, Retired, 1735 Massachusetts Ave., Washington, D. C.

Subject: Request for appointment of a Court of Inquiry.

Your communication of August 16, 1919, requesting the appointment of a Court of Inquiry was offi-

cially considered by the Secretary of War on the 6th of September, 1919, and was refused by him for the following reasons:

"1. During the progress of the war, on January 6, 1918, a prior request of like nature was made by General Crozier, but at that time not pressed by him for the reason that the good of the service did not permit the withdrawal from active operations of the requisite number of officers of rank and experience to constitute such a Court. The same situation now exists; the Army is being demobilized, temporary officers are being discharged, and the heavy burden of closing up the business of the great war and reorganizing the military establishment rests upon the limited number of regular officers available to the department. Such an inquiry as General Crozier desires would necessarily have to be conducted by officers of rank and authority.

2. In October of 1916, the entire subject covered by the allegations attributed to Colonel I. W. Lewis was brought to the attention of the department, and the Secretary of War directed an investigation to be made by General E. A. Garlington, Inspector General. The result of that investigation was a complete exoneration of General Crozier as Chief of Ordnance and of the Ordnance Department in all matters relating to the so-called 'Lewis Machine Gun Controversy.' The Secretary of War approved the findings and conclusions of the Inspector General, so that both by the Inspector General's report and by the action of the Secretary of War the War Department has become responsible for all action taken with regard to the Lewis Machine Gun, and General Crozier's actions and those of the Ordnance Department are vindicated and approved.

3. The Secretary of War has repeatedly, in testimony before Congress and in public statements,

stated as the result of careful investigation and inquiry on his part, aided and informed by official investigations and by examinations of department records, that General Crozier's action with regard to the Machine Gun Controversy was in every respect justified and had the full approval of the Secretary of War. The subject has therefore been investigated and final definite action taken by the Secretary of War, which General Crozier, of course, does not seek to have reversed, but rather reaffirmed.

4. Whatever may have been the teachings of mechanical science, the results of shop and field tests, and the logic of the Machine Gun Controversy before the war, the war itself has completely demonstrated the correctness of the position taken by General Crozier. There is, therefore, nothing left uninvestigated, and in denying the request for the Court of Inquiry the Secretary of War is happy to assert, as a part of the record of General Crozier, his confident approval of his entire course in the matter.

JOHN B. SHURMAN,
*Adjutant General.*"

I replied on September 26th that while I appreciated the expressions of exoneration and approval of the Secretary of War, they left me in the same position as had his former approval, which not only failed to arrest the attention of Congress and the public, but did not stop the attacks of Col. Lewis which had made the vindication necessary. I stated that a material element which had been lacking from my vindication by the War Department, and whose absence could account for the failure of effect, was some expression of condemnation of Col. Lewis for

his false charges, or some disciplinary action toward that officer, and I renewed my request for a court of inquiry or, in default of that, for an expression of opinion by the Secretary of War of the conduct of all officers concerned in the machine gun controversy and range-finder matter, which I had requested that a court should be instructed to give.

My request was again denied, in the following letter:

October 2, 1919.

From: The Adjutant General of the Army.
To: Major General William Crozier, U. S. Army, Retired, 1735 Massachusetts Avenue, Washington, D. C.
Subject: Request for appointment of a Court of Inquiry.

You are informed that your application of September 26, 1919, for a reconsideration of the action heretofore taken upon your request for a Court of Inquiry has been considered by the Secretary of War, who directs that you be informed as follows:

General Crozier himself appeared before the same Committee of the Senate which heard Colonel Lewis. The whole question of the adequacy of our armament and the history of the action taken by the Ordnance Department and the Chief of Ordnance from time to time was thoroughly surveyed, and to the extent that there is any allegation of fact in the statements made by Colonel Lewis, General Crozier's statements were placed in juxtaposition to them and the records of the War Department cited fully. So far as the statements attributed to Colonel Lewis express the opinion entertained by him as to the adequacy of General Crozier's action as Chief of Ordnance, the Secretary of War disagrees entirely with

Colonel Lewis, but does not feel that he has any power to discipline him for such an opinion. No action which the War Department could take would receive greater publicity than the action which it has already taken. The Secretary of War does not believe that well-informed persons entertain any other idea upon this subject than that expressed as the belief of the Secretary of War in the previous memorandum. The hope of reaching and correcting the opinions of uninformed persons on this subject seems too remote to be entertained. In any case, the controversy is ancient and, in the opinion of the Secretary of War, has been adequately disposed of.

JOHN B. SHURMAN,
*Adjutant General.*

I had not asked for the discipline of Col. Lewis for his opinion, but for his unfounded statements of facts and for his improper imputations of motive in speaking, as an officer, of a bureau of the War Department; but having failed to secure from the War Department the action provided for in the articles of war for an officer who considers himself improperly assailed by another, and in the absence of any expression from the War Department even admonitory of Col. Lewis, I have no other recourse than to make the matter public.

I have dealt with the subject of machine guns and with the testimony of Col. Lewis at considerable length, because they afford a good illustration of the kind of criticism which was leveled against the Ordnance Department in the early months of the war, and of the character of information upon which the criticism was based.

Col. Lewis' status as an officer of the army, and as a well known inventor of an important weapon which had met with a pronounced success in the British service, gave to his testimony a standing which could very well be relied upon by any one disposed to criticise. Its effect upon the minds of some of the members of the Senate Military Committee may be seen from the following quotation from a speech of Senator Chamberlain, Chairman of the Committee, made in the Senate on January 24, 1918:

Take the question of machine guns. I am not going into the merits of any particular gun. This has been an old controversy here for years. There are things that can be said on both sides of it. Here was the Lewis gun, that was being manufactured in America for Great Britain. She had 70,000 of them on the battle front, and the testimony of every British soldier that I have seen is as to the excellent character of the gun. There are several kinds of machine guns. America was manufacturing in large numbers and on large contract the Lewis gun for export to the allies and was prepared to turn them out in large quantities. And yet, while we stood along the edge of a seething volcano, we were trifling along with the Ordnance Department, trying to find a machine gun. With this war on, and America in it, we did not even adopt a machine gun until along in May sometime, and it was not finally adopted, I believe, until sometime in June. Then they adopted another gun—not the Lewis gun, that was being used on the battle front in Europe, but a gun that was still a gun on paper, and it is a gun on paper to-day—I do not care what anybody says about it—because it has never been given a field test. It has been developed, Mr. President, that all

of these guns have to be experimented with and developed and changed and modified in one form or another before they can finally become an implement of warfare in the proper sense of the word.

It may be that the Browning gun, the one adopted, is the best gun. It is an automatic rifle. There are two classes of the Lewis gun, one light and one heavy. We are manufacturing the Lewis gun, and manufacturing it for aircraft. If they are good for that, why could we not have adopted the plans then in vogue, and have manufactured the Lewis gun, even if it was not the best gun, until final tests had discovered the best? They are the modern implements of war with heavy artillery, Mr. President, and without them America could not get anywhere. We are going to use them on the aircraft. The reply to the criticism of the tardiness in adopting a machine gun is: "Well, we have thirty or forty thousand of them for aircraft, the lighter kind." But, Mr. President, what I complain of is that they were not manufactured in large quantities in factories that were then manufacturing them for the British Government and for other countries.

I think the Secretary testified in regard to the contracts for the Browning gun. Contracts are out, and the guns are to be delivered sometime at varying dates in the future. I ask you to read Gen. Crozier's testimony. I do not want to go into that. I do not think it would be proper to go into it; but we are advised that we have got some manufactured. The Secretary testified sometime during the middle of January that we had nine guns at that time—nine Browning guns—nine guns to go up against the thousands of the machine guns of Germany. It may be that having nine shows that there is now an opportunity for quantity production, because the gauges may be ready; but we have been

in the war ten months, and nothing has been accomplished in the way of securing these guns.

From this extract it might be inferred that it was the American-made Lewis gun which had been supplied in such large numbers to the British service and had done so well in the war, whereas the great bulk of the guns for the British had been made in England, by the Birmingham Small Arms Company. The Lewis gun of the kind manufactured in America up to the time of our entry into the war had made the record on the Mexican border which has been already described. Notwithstanding that the guns which we purchased had been manufactured under contract for the troops of the British Empire, the right to them was willingly waived, and we were allowed to have them for our much less important use than that which was pressing hard upon the allied forces.

The wording of the speech enables the part quoted to be connected very directly with Col. Lewis' testimony, especially with the following:

*Senator Hitchcock.* Have you seen the Browning gun at all?

*Col. Lewis.* No, sir; but my associate here has seen it. The story of the Browning gun is not a pleasant one, either. When I look upon our National Army at the sixteen different camps over this country, it makes me sick at heart. We have no machine guns except a few Lewis guns that are sent them. Their machine-gun commanders have been officially informed by the War Department that no Lewis gun will go to France.

Now, I have had experience in making the Lewis guns, and I know how long it takes and what expense is attached to making an interchangeable machine gun.

*Senator Weeks.* Even if that statement had been made, it is not true, because the previous witness has testified that he is making 40,000 guns that are going to France.

*Col. Lewis.* I beg your pardon.

*Senator Weeks.* The previous witness testified that he was making 40,000 guns to go to France.

*Col. Lewis.* Oh, you mean aeroplane guns. Those are being manufactured. I am speaking of machine guns for troops in the National Army encampments. They have been officially informed that only Browning guns will be used by the National Army in France for ground work.

*Senator Hitchcock.* You say the story of the Browning gun is a bad one. What do you mean by that?

*Col. Lewis.* You cannot get a definite idea by just taking a picture or a working drawing. I say that there is no such thing as a Browning gun, and it will not be developed in ten months.* They will not turn out an interchangeable Browning gun from any factory in America in ten months from to-day.

*Senator Hitchcock.* How long did it take you to do that with your own gun?

*Col. Lewis.* I landed in Birmingham in March, 1913. This was fifteen months before the war

* Within ten months there were enough Browning guns in France to arm the entire American force.

started. I had six hundred men employed eighteen months, working extra hours, before we turned out the first interchangeable gun in England at a cost of nearly $2,000,000. It was done in approximately peace times, because it preceded the war. It would be much harder to do it now. There were no interchangeable guns made in America up to the time of this war.

*Senator Hitchcock.* Is the Browning gun a simpler gun than yours?

*Col. Lewis.* Not as a manufacturing proposition. I think, in fact, that the machine-gun operations are practically the same. I have not studied it. The Browning gun will not do what the Lewis gun will. It has twenty cartridges in the clip. It will get red hot after you have fired a hundred or so rounds. I can fire 2,000 rounds from the Lewis gun in five minutes and pick the gun up from this table and carry it out. Of course, that would be a physical impossibility for any gun like the Browning gun. You cannot fire 500 rounds in ten minutes—— (Page 707.)

*Senator Frelinghuysen.* You have stated that the Browning gun is a gun on paper.

*Col. Lewis.* That is my opinion; yes, at this moment.

*Senator Frelinghuysen.* You say no gun not tested can be effective?

*Col. Lewis.* Certainly not for the armament of troops in war.

*Senator Frelinghuysen.* Has not a model of the

Browning gun been built, and is it not under test now?

*Col. Lewis.* A model was built, and that model was subjected to a very severe firing test; yes. I do not know whether they are under test now or not.

*Senator Frelinghuysen.* Why did you say the Browning gun is only a gun on paper?

*Col. Lewis.* Because an arsenal test is not a test for any gun or any weapon of war. There is only one test.

*Senator Frelinghuysen.* It is not entirely a gun on paper, because a model of the gun has been built and tested.

*Col. Lewis.* Yes, but that model has already been altered. The gun that they are going to make to issue to the troops is a modified Browning, different from the one accepted by the board and recommended by the board.

*Senator Frelinghuysen.* But more has been accomplished than simply paper specifications. A model has been built and is now under test.

*Col. Lewis.* Yes; but the final specifications, as I understand it, are not yet completed.

*Senator Frelinghuysen.* Then it is not really a paper gun, because a gun has been built.

*Col. Lewis.* There has been a gun built. I did not mean to say that——

*Senator Frelinghuysen.* Then your statement that the gun is on paper is incorrect, because a model has been built.

*Col. Lewis.* I do not see the incorrectness of my

statement, because the final Browning gun that the Army has contracted for has not yet been built.

*Senator Frelinghuysen.* Would you have considered that the Lewis gun, of which specifications had been drawn and two models had been made and tested, a gun on paper?

*Col. Lewis.* It was a gun under development. It was not a service model absolutely. In the condition it was submitted, it was not a gun suitable for military purposes, a gun for the armament of troops. No gun in the development stage is suitable for the armament of troops in quantities.

*Senator Frelinghuysen.* The Lewis gun was not satisfactory.

*Col. Lewis.* Not in 1913; no. I cannot claim that it was, Senator.

*Senator Frelinghuysen.* Then your criticism that the Browning gun is a gun on paper is equally applicable to the Lewis gun?

*Col. Lewis.* It is a gun under development. (Page 714.)

Not all of the members of the Committee were similarly affected as Senator Chamberlain by Col. Lewis' testimony, but that some of them were is indicated by the following quotation from an interview with Senator Wadsworth, published in the New York *Times* of September 22d:

"The committee has never questioned the excellence of the Browning gun, but it did urge that our army should be furnished with Lewis guns, easily obtainable in this country, until the Browning gun had been thoroughly tested and put into quantity

production. The Ordnance Department failed to take the Lewis gun for ground use, although it had given eminent satisfaction to the British. While we were waiting for nearly a year for the Browning gun to come through, the devoted French had to supply our troops in France with machine guns of their own manufacture, as they have also done with guns of larger caliber."

The preceding narrative shows that the Ordnance Department did not wait for the Browning gun to come through, but did exactly as the Senator says it should have done; that is, it gave orders for the Lewis gun as soon as it reached a state of development in which its own producers claimed a successful test of it with our ammunition, and it then occupied the factory to capacity while making other factories ready to turn out the Browning gun. Criticism of this course can only be understood as a claim that the Department should have given orders for Lewis guns before the test of April, 1917; that is, immediately upon the appropriation of funds for guns in 1916, notwithstanding that such action would have used up our money for a gun which the best advice that we could get had declared to be unsatisfactory, instead of for the well known and thoroughly indorsed Vickers gun, and would have meant turning down the carefully formed conclusions of the most competent advisory agencies which the War Department had known how to create.

The French Government was perfectly capable of supplying the American force with machine guns,

and was very anxious to do so. The French capacity was more than sufficient to supply the needs of the French troops, and it was to the distinct advantage of that Government to employ this capacity for the benefit of the United States, with the resultant offset to a portion of the indebtedness of France. The attitude of the French Government is indicated by the following quotation from a letter from the French High Commissioner in Washington to the Chief of Ordnance, dated September 7, 1917 (CMG-472. 583/3).

My Government has also proposed to Gen. Pershing for the next ten divisions sent to France, 2,600 machine guns, thus making a total of 3,340 Hotchkiss machine guns firing the French ammunition.

Of these 3,340 machine guns, 2,600, about, are to be delivered before the 1st of January, 1918.

. . . . . .

As you can see, the French Government is in a position to fulfil all requirements of the United States Expeditionary Forces abroad, so far as heavy machine guns are concerned.

And from another letter dated December 5, 1917 (CMG-472. 574/8), in regard to the manufacture of the light type of machine gun and automatic rifle:

I beg to state that I am informed by my Government that the factory manufacturing the 25,000 Chauchat rifles for the American Army expects to have the whole lot completed about March, 1918.

Under these conditions, I am directed to ask you whether you will be prepared to place a further

order and what will be the importance of this order. This information is necessary to plan out the output of the factories concerned for 1918.

The French had no difficulty in supplying our troops in France with Hotchkiss machine guns and Chauchat automatic rifles as long as they were needed, which was until the end of April, 1918. The divisions which went over in May and June of that year were all armed with Chauchat automatic rifles, but they had American-made Vickers machine guns. The divisions which went over after June were all armed with Browning machine guns and Browning automatic rifles, made of course in the United States. By the time the Armistice was signed, enough Browning guns of both classes had arrived in France to equip all the American forces, but the change was not completely made from the guns which they were using, because of the extremely active operations which were going on.

## VII

### FIELD ARTILLERY

THERE is probably no one in the United States who is not aware of the fact that we entered the Great War with a very inadequate supply of field artillery. When the Senate Military Committee commenced its investigation of the War Department, in December, 1917, this shortage was naturally a very prominent subject of inquiry and criticism. The criticism was divided under four principal heads: the inadequacy of original supply; the strain put upon our Allies in the effort to meet the shortage; the slowness of production of American artillery after our entrance into the war; and certain special allegations concerning the reasons for this slowness. An important arraignment of the Ordnance Department was contained in the New York speech of Senator Chamberlain, which has been previously referred to, and is expressed in the following quotation from his speech of January 24, 1918, in the Senate:

"Mr. President, the Secretary of War, in his general statement to the country—which was carefully written and prepared—tells us that $3,200,000,000 have been appropriated for the Ordnance Depart-

ment, and contracts have been let for $1,677,000,000; all of which is true. But the Secretary fails to tell us, Mr. President, in his statement to the country, and it only comes out in the course of a cross-examination, that America stands to-day unprepared so far as ordnance is concerned. I challenge anybody to read the testimony and come to any other conclusion. Poor, bleeding France, my friends—bled white, not only for her own life and for the liberty of her own citizens but for America as well—is to-day furnishing our troops as they arrive in France the necessary heavy ordnance and machine guns for aircraft and for ground service. Why, Mr. President, if we relied upon the Ordnance Department in this emergency to furnish our troops with the heavy ordnance—and this is largely a war of artillery to-day—the war would be over before we ever got to the front.

Why, there is testimony, if I correctly remember it, before the Military Affairs Committee that along some of these fronts the cannon—and heavy cannon, if you please—are located five yards apart for a distance of six miles; and yet America, this great and magnificent country, is dependent upon poor France to deliver our ordnance! Did France agree to deliver it in order to win over reluctant America? Did she agree to furnish it in order to encourage and hearten America? What would happen to France with the debacle in Italy, Senators, where her own troops are and where the troops of her Allies are if she is to furnish ordnance to America? What is France to do for them in case of an

emergency and a desperate battle for the life of one of her Allies?

I will not go into details, I do not think it would be proper to go into details, but I call to the attention of the Senate the confidential evidence of Gen. Crozier himself as to the amount of contracts which the Secretary speaks of as having been let, and as to the progress of the work. If the Administration wanted to be fair with the American people—and they are entitled to fair treatment, and to know these things—why did not the distinguished Secretary, whom I hold in the very highest regard as an able and intellectual gentleman, tell the American people how long it would take to make deliveries under these contracts and let them assist in getting ready for this terrible cataclysm that not only confronts America but confronts the world?"

The Senator's charges were undoubtedly based partly upon his general information in regard to the situation acquired from the discussions which had taken place, and partly upon the testimony which had been given before his committee. The testimony which appeared most directly to support his charges was that of Col. Lewis, which, upon this particular point, was partially as follows, on December 22, 1917:

"The equipment of our troops in France, the pitiful handful of men, hardly equal to the casualty lists of the British that we get week by week—the equipment of those men is an outrage and a disgrace to this country.

They have neither machine guns nor a suitable supply of rifles; they have no field artillery except what we are begging and borrowing from France, which is stripped to the skin. We are not going to get armament to them in ten months from to-day nor one year from to-day. We will not have 1,000,000 armed men in the field, because America will be absolutely unable to supply the arms and ammunition required. Somebody is responsible for that; something is responsible; some system is responsible for it. Can you fix the responsibility?

I can tell you a part of it. As to this particular question of guns and ammunition, the responsibility primarily rests upon the Bureau of Ordnance of the War Department. There is no escape from that conclusion. Gen. Crozier to-day is more responsible for the obsolete and inadequate equipment that the United States forces have than any other living man." (Page 705.)

I am not excusing or trying in any manner to explain away the unfortunate shortage in artillery or in any other class of war material, which the country apparently awoke to only after we got well into the war, but which I had been well aware of for a long time. The condition ought not to have existed, but I claim freedom of responsibility for it upon the part of the Ordnance Department. In common with all other officers who were in a position to make recommendations, I had in my annual reports and in my hearings before committees of Congress persistently urged that bigger appropriations be made,

especially for field artillery and field artillery ammunition. I could fill a volume with quotations, but the following will serve sufficiently for illustration. In my hearing on the Fortification Bill before the proper sub-committee of the Committee on Appropriations of the House of Representatives, on January 25, 1906, I stated as follows:

"Let me explain to you what this appropriation will do, if you decide to make it. I am hoping to supply for use in war 250 batteries of guns of this class. . . . That will be at the rate of two guns per 1,000 men for an army of 500,000, which is a very moderate estimate. . . . Thus far there has been provided by appropriations . . . sixty-nine of these batteries. . . . That will leave such a number to be provided that at the rate at which they are estimated for in this item, a supply will be completed in the year 1919. . . .

I would like to say, in connection with this item, that it is a very important one, because this material is of a class that cannot be procured on short notice. It takes a great while to build these guns and to build the carriages and to get the ammunition for them."

And in my hearing before the Senate Committee upon the same bill, on February 27, 1906, there occurred the following:

*The Chairman:* . . . The subcommittee had thought it unnecessary to have any hearings on the pending bill until they received your communication dealing mostly with the necessity for a reserve sup-

ply of ammunition. . . . The communication referred to is as follows:

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ORDNANCE,
Washington, February 23, 1906.

THE SECRETARY OF WAR.

*Sir:*

I have the honor to request that the attention of the Senate be invited to the following matters with reference to the bill (H. R. 14171) making appropriations for fortifications, etc., now pending before that body.

FIELD ARTILLERY.

This department is endeavoring to bring into existence a supply of 250 batteries, which is in the very moderate proportion of two guns per 1,000 men for an army of 500,000. The appropriation carried by lines 1 to 5 of the bill, added to an appropriation carried in the pending Army bill for batteries for the militia, will permit the construction of eleven batteries. At this rate the procurement of the supply needed will be delayed until the year 1923, seventy batteries having been previously provided for.

. . . . . .

Ammunition and mobile artillery are the items of material in which military preparation of the United States is now most behind.

Very respectfully,

WILLIAM CROZIER,
*Brig.-Gen., Chief of Ordnance, U. S. A.*

. . . . . .

*Question:* Kindly explain to us, General, the field artillery; where it is manufactured, and your recommendation therefor; why the appropriation was so

largely reduced in the House; what motive influenced them there, and also your views relative not only to the necessity, but the policy of the Government continuing this work in the expectation of completing these guns and carriages.

*Gen. Crozier* . . . The estimate which I submitted to the Secretary of War for this purpose called for about $1,200,000. With that amount and with money amounting to about $550,000, which is carried by the Army appropriation bill for the purpose of procuring batteries for issue to the militia, I expected to procure this field artillery at such a rate that the 250 batteries, which I think are necessary, would have been supplied by the year 1916. By direction of the Secretary of War I reduced the estimate from $1,200,000 to $600,000. That so increased the time necessary that the earliest date at which we would under it have been able to get our entire reserve would have been 1919. Now this estimate of $600,000 has been further reduced by the bill, as it has passed the House of Representatives, to $310,000. With this amount I shall be able to get only three batteries of field artillery, it not all being available for the purchase of field artillery, but the remainder going for other items which are mentioned in the bill. These three batteries, added to the eight which are provided for in the Army Appropriation Bill, will make eleven batteries, which are all I can manufacture during the coming year unless the appropriation is increased. Now, seventy batteries have already been provided for. Two hundred and fifty being required, one hundred and eighty are

left. One hundred and eighty batteries at eleven batteries a year would require a time until about the year 1923 for their procurement. This is a plain statement of the case, gentlemen, and when I have made it you know as much about the subject as I do."

In my annual report to the Secretary of War for the fiscal year ending June 30, 1910, I stated the following in regard to the supply of field or mobile artillery:

"The supply of this material provided for to date is less adequate than that of any other class of fighting equipment. The types needed have been developed and some of each are under manufacture, but the appropriations do not permit of production in any considerable quantity. It is considered that in case of an emergency of any importance the field artillery equipment would be found to be insufficient, and it is consequently thought that the financial conditions which have rendered impossible the acquisition of a much larger reserve are unfortunate."

The following extracts are from my hearings on the Fortification Bill and the Army Bill at various subsequent times:

From my hearing on the Fortification Bill, January 12, 1911:

"Nothing is, perhaps, more striking than that as we make some progress it is impressed upon us how very slowly we are going, and how far we have yet to go. I think I have called it to the attention of the committee for several years past that as regards our preparation for war, we are worse off in this matter of field artillery than we are in anything else

that we have, connected with the matériel. We are better off with reference to the seacoast armament; we are better off with reference to small arms; we are better off with reference to small arms ammunition; we are better off with reference to personal equipment of the soldier and with reference to horse equipment for the cavalry, than we are with reference to this item of field artillery."

From my hearing on the Army bill, March 11, 1912:

"*Question.* It takes a long time to manufacture these field guns?

*Gen. Crozier.* Yes.

*Question.* How long does it take?

*Gen. Crozier.* I do not think that we could count on getting a battery delivered in less than a year from the time the order was given. I do not mean to say that it would take a year for each battery, but deliveries would not begin until a year after the order was given.

*Question.* Is it very important to have them on hand?

*Gen. Crozier.* Yes; it is the slowest manufacture of any of the fighting matériel which we need."

From my hearing on the Fortification Bill, January 15, 1912:

"*Question.* What I am trying to get at is this: At what period of time would it be desirable, assuming that the army had to be recruited up to its strength for purposes of war, to have the guns to deliver?

*Gen. Crozier.* I should think that we ought to have them within a couple of months, under the

present circumstances, of the time at which it is decided to put the army on its war footing. However, I think the circumstances ought to be such, and it is the duty of the Government to have them such, that matériel would be needed in a fortnight.

*Question.* I appreciate that; but in the absence of that condition existing, is there any particular need of our advancing so rapidly in the supply of this matériel? You now have all the batteries that are needed by the Regular Army, with some reserve; you now have all the batteries and more than can be distributed among the militia, and the question necessarily arises, in connection with as large an item as this, as to the present need of supplying batteries in the amount requested.

*Gen. Crozier.* The Regular Army, of course, is such a small force that the fact of its being completely equipped with everything that it requires is one of no great moment, when you consider the force that ought to be equipped. The whole idea of preparation for war in this country is and ought to be the maintenance of a small force continually in the service and the rapid expansion of that force in time of war, which rapid expansion ought to be possible to be made with men who will already have had some training. Now, if we should ever arrive at that state, as I say, we would need this matériel. If there should be a state of confusion, lack of preparation, or absence of method by which the Army could be increased in size rapidly and effectively, I should not like to say how much we might be slack in one element to meet the slackness in others.

*Question.* The present army is more than sufficient in size for any offensive movement that we would ever contemplate?

*Gen. Crozier.* I do not think so, Mr. Chairman, by any means.

*Question.* Your idea of an army of 450,000 men is a defensive army of that size, is it not?

*Gen. Crozier.* Yes. But the number of troops that we could use offensively is very different from the army that we have now. Of course, I might go on and amplify that, but I could not tell you anything that you are probably not as well aware of as I am with regard to the possibility and necessity of using a larger force in any of the problems that may confront the country.

. . . . . .

I might refer to the fact that I have been asking for a good deal more than I have gotten, because I have been trying to impress upon the committee that this class of material is that in regard to which our straits are greatest. We are better prepared to enter upon a war with respect to everything else that is to be supplied in the way of matériel than field artillery and field artillery ammunition. It is sometimes stated — irresponsibly, of course — that we never get through asking and that we always represent ourselves as in a deplorable condition."

Again in my annual report for the year ending June 30, 1913, which was made in October of that year, less than a year before the outbreak of the European War, I said in regard to the supply of mobile artillery:

"As stated in my last annual report, the supply of this class of equipment is less satisfactory than that of any other furnished by the Ordnance Department, except the ammunition for field artillery. The appropriations for the last two years for this purpose have been somewhat larger than for several years prior to that time, but it is hoped that still larger annual appropriations may be made, as even the present rate is not such as to provide a sufficient amount within a reasonable time."

Notwithstanding these appeals, no appropriation as large as $3,000,000 was made for field artillery within the years since the Spanish-American War, and, as appears from the extracts, the annual appropriation was often very much less than that sum, until after the passage of the National Defense Act, on June 3, 1916, when the sums appropriated in the Fortification Bill and in the Army Bill, passed respectively in July and August of that year, for field artillery aggregated $16,321,000. While this indicated a significant advance in congressional ideas with reference to military preparation, and provided a sum which, if it had been annually supplied from the period when I had commenced pleading, would have brought us to the war in much better condition of accumulated supply and usefully equipped plants, the adequacy of the sum for the equipment in field artillery of an army of 1,000,000 men may be judged from the amount which was asked for and appropriated for this purpose during the first three months following our declaration of war with Germany on April 6, 1917, which was

$171,900,000; and the still further inadequacy of the sum for providing artillery for the larger army which we soon saw we would have to raise, can be understood from the appropriation made in the Act of October 6, 1917, for the purpose, which was $225,000,000.

The information contained in the above extracts had been brought by me to Senator Chamberlain's attention before he made his New York speech, in my hearings before his committee, but perhaps the attitude of his mind toward the source of this information can be grasped from the following quotation from his speech in the Senate:

"Whenever you get a soldier who has not any other ambition than an ambition to serve his country, you will invariably get the truth. It is not always so with one of these swivel-chair artists who wants to go higher and from whom you cannot ascertain what the truth is."

The passage referred to testimony of Gen. E. St. J. Greble, before the Senate Military Committee, in regard to the equipment and the sanitary and other conditions in the division which he was commanding. Gen. Greble is a capable officer whose testimony is worthy of all credence, but in regard to ordnance equipment he simply stated his shortages, indicating his belief that they occurred through necessity for utilizing the limited military supplies in equipping the first divisions to sail for France, and did not indicate any blame for the limitations of the supply. The passage apparently indicates the initial handicap of a staff officer in laying

the condition of his department before Senator Chamberlain, as compared with those whose information was necessarily less complete.

When the subject of responsibility for shortages was brought up in the Senate Military Committee hearings, I did not charge the responsibility against Congress; but I stated that it should be placed upon the whole people of the United States. The people had taken no interest in the matter of military preparation, during the series of years following, as well as preceding, the Spanish-American War. They had concerned themselves, after the manner which they well know how to make effective, with the sentiments of their representatives upon the tariff, the currency, the control of the trusts, and the regulation of the railroads, but they had displayed no curiosity nor imposed any instructions in regard to military matters, and there was no constituency in the country in which the return of the member depended in the slightest degree upon his attitude on any military question. At as late a period as that of the political campaign of 1916 a leading member of Congress told me that he found that an attempt to talk upon the subject of military preparation in the great Middle West speedily emptied the hall, and that he had to make hasty study to prepare himself upon other subjects, when he had considered himself well prepared for the campaign by reason of the knowledge which his special committee service in Congress had given him on the subject of armament and organization. His audiences had an interest in the European War, and would listen to

information about it; but they apparently had no interest in getting ready for a possible part in it.

The scheme of the National Defence Act did not contemplate preparation for entering the European War, for it provided a plan of military organization, and supply of the resulting forces, to extend over a period of five years. While many thought that the war would not be of short duration, it is evident that a five year plan, entered upon in the summer of 1916, was not made with relation to it.

While the responsibility for military shortages must, therefore, be borne by the whole people, ultimately, the theory of representative government places the immediate charge upon the Administration and upon Congress; at least to the extent to which these agencies of the people are expected to be leaders in policy, instead of followers of the multitude. All through the period of preparation the estimates for funds of such military agencies as the Ordnance Department were repeatedly reduced in the War Department, by direction of the Administration; and after the European War was in full progress the Administration discouraged warnings of military unpreparedness as being hysterical, and, through the mouth of the Secretary of State, opposed even reasonable defensive measures, on the ground that they might be taken as an indication of our intention to take part in the war. Under these long-continued conditions, it would appear that, if any element of the Republic ought to escape criticism for failure to exercise proper foresight, it should be the military element; perhaps because its

personnel were paid to concern themselves with the subject.

In this state of affairs it is hard to understand the object or the bearing of the criticisms of the War Department for accepting assistance from the French and English governments in the supply of artillery and machine guns. While we all deplore the necessity for this assistance the necessity was upon us, and criticism for yielding to it and making the best of the situation is inexplicable. The willingness, and more, of the French and English allies to render this aid is exhibited by certain expressions from them which accompanied the negotiations for the supply of artillery for the American forces. Upon the conclusion of the first arrangement for the purchase of 75 mm. field guns and 155 mm. howitzers—the two most important pieces of artillery—from the French Government, the High Commissioner of that Republic, Mr. André Tardieu, prepared a notice for publication in the French press in order to furnish the French citizens with information in regard to our transaction, of which his own estimate was shown by his expressions. The notice was as follows:

Washington, 14 Juillet, 1917.

Présidence Conseil,
Copie à Guerre-Armament,
*(Note for the French Press)*
Translation.

An important agreement has been concluded between the United States Government and the French High Commissioner, Monsieur André Tardieu.

According to said agreement the American Government adopts the two principal pieces of matériel of French artillery, the 75 millimeter field gun and the 155 millimeter rapid-fire howitzer.

The Expeditionary Corps of Gen. Pershing has received from the French authorities, on arrival, its field artillery, its rapid-fire heavy artillery and its trench artillery, which, of course, will accelerate its taking place in the line.

At the same time the artillery production in France and in America has been organized so that the American Army of 1,000,000 men which is about to be recruited, will receive without delay, as the units are formed, the necessary heavy and light guns.

The negotiations taken up for the first time at the end of May between Monsieur André Tardieu, French High Commissioner, Monsieur Ganne, Chief of War Munitions of the High Commission, and Brig.-Gen. Crozier, Chief of Ordnance, were characterized by two ideas.

On one hand the American Government wished to adopt the quickest solution, in order to realize in the shortest time the complete armament of its forces.

On the other hand, with great foresight they attached particular importance to realizing, for the American and French armies, called to fight on the same battlefields, uniformity of munitions, of such capital importance from a tactical point of view.

In view of these two desired aims, the French High Commissioner was able, thanks to the development since 1916 of the machine equipment of our war munitions factories, to furnish Gen. Crozier with a detailed plan of industrial collaboration which by the united efforts of the French and American industries, will assure the complete realization of the American program.

The double certainty of rapid production and uniformity of munitions, decided the United States Government, despite the incontestable value of its own matériel, especially that of the three-inch field gun, of which the superior qualities are universally recognized, to adopt our 75 and our short 155.

The negotiations on these lines were rapidly completed at the end of somewhat over one month; they were concluded this week by a complete understanding fixing the quantity and the price of the matériel to be furnished.

This understanding susceptible of important further developments, is a precious proof of the esteem in which the most powerful industrial country of the world holds our engineers and our mechanical constructors. It has also a practical bearing of great value.

From the military point of view it is evident that uniformity of type of guns and munitions for armies fighting on the same battle-fields, is an appreciable guarantee of safety and efficiency. The supply and volume of fire are thereby equally facilitated. Unity results spontaneously from identity of weapons. Finally, all tactical results, obtained by the experience of three years of war, are without previous adaptation, assimilated by the American Army.

From the industrial viewpoint, the unity of effort created between the manufacturing plants of the two countries, will produce happy results without precedent, not only during the war, but also subsequently. Common action provides the best means of mutual acquaintance and for preparation of the close co-operation which it is desired to organize for the future.

From the financial standpoint it is possible to hope that the purchase by the United States of French artillery matériel will create an improve-

ment in exchange, which under the existing relations of America and her European allies, is as much to be desired by the United States as by France.

It is also likely that the adoption of the metric system, which has been officially requested by the American Bureau of Standards and which is much to be desired from the point of view of future Franco-American interests, may be thereby facilitated.

These are, briefly stated, some of the results, certain or probable, of the agreement between the French High Commissioner and the American Government.

The dominant note of the agreement lies in the proof it gives of the unshakable resolution of the American Government to achieve in the shortest time the maximum of military strength, and on the other hand it proves the intimate and active co-operation existing between the United States and France.

Mr. Baker, Secretary of War, and Gen. Crozier, Chief of Ordnance of the American Government, have given proof in this case of the broadest spirit of comprehension and decision and have succeeded in a few weeks in securing for the American troops artillery of the first order.

Our High Commissioner at Washington speaks in unbounded praise of their cooperation with him.

We may add that the first French guns arrived last week in the United States and that the Artillery School of Saumur has been placed at the disposal of the American Army for training purposes.

Later, the French Government proposed to furnish a supply of more powerful pieces of artillery, namely, 155 mm. guns, following negotiations which had already been opened in France with Gen. Persh-

ing. The letter from the French High Commissioner in Washington conveying this proposal was as follows:

Washington, D. C.,
August 22, 1917.

THE HIGH COMMISSIONER OF THE FRENCH REPUBLIC IN THE UNITED STATES.

*To Brigadier-General William Crozier, Chief of Ordnance, War Department, New York City.*

*My dear General:*

Confirming the conversation you had yesterday with Col. Rémond and Capt. de Jarny, I beg to inform you that I have received a cable from my Government stating that, at the request of Gen. Pershing, the French Government have proposed the sale of forty-eight 155 mm. guns of Filloux type.

These guns will be delivered at the rate of one battalion (twelve guns) per month for each month from September to December.

It will be possible to continue deliveries at the same rate after January 1, 1918, and probably to increase this proportion.

It should be noted that it will be difficult for the French Government to supply the necessary tractors and other motor vehicles entering into the composition of one battery of 155 mm. guns.

I note from verbal information received that your Government will be in a position to supply the necessary tractors in December. I am therefore cabling my Government, asking whether they can make the necessary arrangements to provide caterpillar tractors and trucks corresponding to the batteries due in September, October and November.

I would greatly appreciate, my dear General, if you could let me know whether the United States

Government is prepared to give me an order for the guns in question and under which conditions.

I beg to remain, my dear General,

Yours faithfully,

ANDRÉ TARDIEU.

An order for the 155 mm. guns was given, and certain of these pieces were immediately turned over to our forces in France while a larger supply was put in manufacture. The supply of 155 mm. howitzers by the French proceeded more rapidly than had been anticipated when negotiations were first entered into; that is, the French Government found itself better able than it had promised to make prompt deliveries; of which I was informed by the following letter from the High Commissioner:

Washington, D. C.,
September 26, 1917.

THE HIGH COMMISSIONER OF THE FRENCH REPUBLIC IN THE UNITED STATES,

*To the Carriage Division, Office of the Chief of Ordnance, U. S. A., 1703 New York Ave., N. W., Washington.*

*Sir:*

. . . . . .

2. I wish also to confirm that, as per your request, 48 Schneider Howitzers will be ready for the 15th of October instead of 30, as originally provided.

Yours faithfully,

ANDRÉ TARDIEU.

When the Commission headed by Col. House was sent to Europe to confer with the highest British and French authorities in regard to the scheme of

cooperation of the allies, in the autumn of 1917, the supply of the American forces with artillery was carefully considered, and the decision as to the part to be played by European factories in a coordinated effort to utilize the productive capacity of the allies was expressed in a cablegram from Gen. Tasker H. Bliss, Chief of Staff of the United States Army, who accompanied the Commission. Extracts from this cablegram are as follows:

Received at the War Department December 5, 1917, 7:17 A. M. 1, CO. London.

THE ADJUTANT-GENERAL,
Washington.

. . . . . .

. . . in order to insure the equipment with artillery and ammunition of the American troops as fast as they arrive in France, the Ministers of Munitions of France and England, and Perkins, representing the United States, have exhaustively examined the situation and adopted the following resolutions for their respective governments:

"The representatives of Great Britain and France state that their production of artillery (field, medium and heavy), is now established on so large a scale that they (are) able to equip completely all American divisions as they arrive in France during the year 1918 with the best makes of British and French guns and howitzers. . . . With a view therefore first to expedite and facilitate the equipment of the American armies in France and second to securing the maximum ultimate development of the ammunition supply with the minimum strain upon available tonnage, the representatives of Great Britain and France propose that the Amer-

ican field, medium and heavy artillery be supplied during 1918 and as long after as may be found convenient from British and French gun factories.'' . . .
(Signed) Bliss.

These exhibits are conclusive as to the attitude of the French and English governments toward the task of supplying our troops with artillery. There was, of course, perfectly good reason why, notwithstanding their three years' expenditure of effort, they were in position to give us such effective and much-needed assistance. Their own manufacturing capacity had been much enlarged in order to provide the initial equipment in artillery of their own greatly increased forces, and to supply the further demand occasioned by the augmentation of the proportion of artillery to other branches of the service which experience in the war had shown to be necessary. By the time of our entrance into the war their factories had filled this program, and their capacity was much greater than was necessary to make good the current wastage and was, therefore, available for arming our troops.

As to our own program, both for artillery and machine guns, and the question whether it ought not to have been smaller in order to insure earlier fruit from it, it must be remembered that the experience of our Allies, and especially of the British, in failing to see large enough at the beginning of the war, and to inaugurate means for an ample supply, had been somewhat bitter; and with this experience before us the American military authorities could not have escaped just criticism if we had made the same

mistake. The event bore out the judgment exercised; for while the great flow of American-made artillery to Europe did not commence before the conclusion of the fighting, a certain flow had commenced, the evidence of which is the 2,000 complete artillery units—gun, carriage, limber, etc., which were produced here for ourselves and our Allies between our declaration of war and the signing of the Armistice. This output of finished artillery, coupled with the supply of over 14,000 gun forgings and a large number of other partially finished artillery components to our allies, and the delivery of finished artillery furnished by them to the American forces, prevented any shortage for the troops on the firing line during the continuance of hostilities. The abundant provision for further hostilities was thus not secured at the price of any skimping of the fighters during the active operations; while the 2,000 completed American guns were over 85 per cent of the total number of guns in action in the American Expeditionary Force during the war, although only 800 of the 2,000 were shipped abroad.

Senator Chamberlain also charged the Ordnance Department with great inertia after the outbreak of the European War. The following quotation is a further illustration of his state of mind:

"What has the Ordnance Department been doing since 1914? Was there even a half-witted American citizen who at the very outset did not know and realize that there was a chance that America might become involved? There were omens in the sky, my colleagues, that indicated that America would

become involved, notwithstanding her desire to keep out. She could not keep out. What was the Ordnance Department doing? Nothing. Here we were from August, 1914, until the declaration of war in April, 1917, with the Ordnance Department lying supinely upon its back, making no plans, constructing no gauges, manufacturing no dies, doing absolutely nothing to ascertain what were the possibilities in raw material and the possibilities of manufacture. It would not have taken any time, it would not have cost much, if anything, to have done that. Congress appropriated quite a large sum in two or three appropriation bills for the purpose of manufacturing dies, jigs, and gauges to be used in the construction of all of these implements of artillery warfare. That money has not been expended; and yet every business man and every sensible man in this country knows that for quantity production it is absolutely necessary to have the gauges and the jigs and the dies, so that when you are ready to manufacture all you have to do is to send them out, so that guns may be manufactured along those lines. What was the Ordnance Department doing? Nothing."

Testimony in regard to the plan for the manufacture and supply of gauges, templates and other like auxiliaries is found on pages 243-245 of the hearings before the Senate Military Committee. The testimony shows that of the sum of $2,050,000 which had been appropriated for gauges, jigs, fixtures, etc., $1,728,000 had been allotted in manufacturing orders at the time of the hearing. When the

first appropriations became available, negotiations were opened with the tool and gauge manufacturers of the United States for carrying out their object, and earnest attention was given to this highly specialized subject. The first appropriation, however, had been made as late as the summer of 1916, and the whole plan was necessarily of a character to require looking to the future for results of any very great importance. Every person with any knowledge of manufacturing methods understands that the tool, gauge and fixture equipment for an extensive output by the methods of quantity production is a proposition of a long time of execution, and it should require nothing more than a statement of dates to see at once that the contingency for which the appropriations were intended to provide some preparation was upon us before there was any possibility of effective results from the plan. The gauge project of the Ordnance Department included the early loan of Dr. Fisher by the United States Bureau of Standards, and his commission as a major in the department for taking charge of this very extensive matter. The close attention given to it and the value of the cooperation of the great gauge makers of the country are evidenced by the fine degree of interchangeability which was secured in all the manufacture of standardized matériel during the war.

The criticism of the Ordnance Department for delay in the manufacture of artillery was joined in by Senator Wadsworth in an interview which was printed in the New York *Times* on September 22,

1918. In this interview the Senator was reported as saying:

"Knowing that our troops in the field have been obliged to call upon the French for practically all their artillery; knowing, for instance, that at the first independent operation of the American Army, that of the reduction of the St. Mihiel salient, a very few American-made guns were in operation, we have felt it our imperative duty to inquire into the conditions that produced this situation. Why should it exist when the United States had been at war for seventeen months and after we have appropriated over a billion dollars for the construction of ordnance?"

This statement might produce the impression that as late as September, 1918, our army had had no field artillery, and that the portion of the army in France had been obliged to turn to the French Government or do without altogether; while as a matter of fact, as heretofore stated in this account, the supply by the French Government had been carefully arranged by the Ordnance Department from the beginning, with the cordial approval of that Government which was anxious to furnish the artillery, while the American initial supply and that which had been manufactured since the beginning of the war, which would have been much more than enough for our troops engaged at St. Mihiel, had been kept in the United States for the training of new regiments.

The Senator, in the continuation of his interview, stated the reason for the delay in the manufacture of American artillery as follows:

"Upon investigation we encountered these facts: It seems that in July, 1917, the French Government offered us the use of its priceless secret of the famous French 75s. You will realize its peculiar and inestimable value if you recall the well-known fact that it is often said that these 75s saved Paris in 1914, while they have at all times been the backbone of the French artillery service. The secret of their mechanism lies in their recuperator, which is assembled in the French factories with every safeguard for secrecy. Although the Germans have captured hundreds of these guns and have many times pulled them apart in efforts to discover the secret of their construction, they have never yet been able to make a gun the equal of or in any way similar to those French 75s. The exquisitely delicate mechanism of the recuperator has always defied their analysis. However, this offer apparently did not appeal to the War Department, which failed to take advantage of it. Instead, the American Ordnance Department decided to develop and perfect a design of gun carriage and recuperator which, it was confidently believed, would be superior to the French and all other models. Orders were given for several thousands of these American 75s."

This statement would be calculated to lead any one to suppose that there was some definite secret of manufacture of the French 75 mm. gun which could be imparted directly as a piece of information to the Ordnance Department, and would enable it, and manufacturers informed by it, to proceed at once with the production of this weapon in quan-

tities. This is so far from being the case that, at the time of the commencement of the arrangements with reference to the supply of French artillery to us, the representative of the French Government assured the Ordnance Department that the department would not be able to make the recuperator of the French 75 mm. gun carriage until after a long course of practice under instruction, and cited in support of this advice the inability of the Germans, which the Senator mentions, to manufacture these recuperators, even with the assistance of captured French guns, which, of course, they were able to minutely examine. With this warning the Ordnance Department, while giving orders for the manufacture in France of a large number of French guns, and arranging for the continuance of the manufacture in the United States of guns of its own models and of British models which was already under way, proceeded to take all possible steps for learning how to manufacture the French recuperator, so that it might have this knowledge upon need for its use. To this end, it sent experts to French factories, secured the visit to this country of French experts and procured samples of the French 75 mm. guns for examination and tryout, as well as making close study of the French drawings of the recuperator of the 75 mm. gun carriage, which were not received in detail until as late as December, 1917, and were then found to be incomplete. All this constituted the most earnest effort which it was known how to make to master this particular piece of manufacture which the Department had been assured was so dif-

ficult to learn, even with the best instruction. We speedily learned that the so-called secret was a very small part of the matter, but that the real difficulty lay in the time required to train a great body of workmen in the special and peculiar skill necessary for manufacturing, fitting together and adjusting to its work this nice mechanism. We learned to understand why it had taken the French, as they had told us, years to accomplish this.

In the meantime, among other means for securing a supply of American-made artillery of this caliber, the Ordnance Department gave orders for the continued manufacture of American 75s, known as the model of 1916, which had already been experimented with and were in course of further production at the time. The American orders were not for a carriage of a design to be developed and perfected, but for one which had already been under development during the course of three years of experimentation, and was under orders for manufacture in the limited quantities which the appropriations before the war permitted. Further improvement in it was contemplated, but this was to come on at a later period, to be applied if it should prove successful.

In support of the reasons which he had advanced for the delay in the manufacture in America of 75 mm. gun carriages, the Senator proceeded in his interview as follows:

"After months of effort and the failure to produce the carriages and recuperators, manufacturers who had undertaken these contracts protested to the Ordnance Department that the carriages and recu-

perators could not be turned out in quantity production. They were too complicated.

Toward the end of February, 1918, the Ordnance Department was forced to the same conclusion, cancelled contracts for four-fifths of the American designed carriages and recuperators and decided to adopt and put into production the French models. Thus there occurred a delay of many months."

Perhaps a short statement of the pronounced characteristics of the French model of 75 mm. gun carriage and of the American model known as that of 1916 may be of interest, in view of the fact that the major part of the criticism of the War Department, for its alleged failure to supply our troops with field artillery as promptly as the critics asserted that it might have been done, centers upon the treatment of this question between the two types of 75 mm. carriage.

Both models are of what is known as the long recoil type. That is, the gun, upon firing, recoils between three and four feet upon the carriage, and is automatically returned to the firing position. This long recoil so softens the action of the gun upon the carriage that the latter is not displaced by the recoil, and the gunner sits upon a seat attached to the trail without moving his eye from the sight, which, of course, is attached to a non-recoiling part of the carriage, and continues to fire the piece as rapidly as it can be reloaded. No time is required for re-aim at the target, since the carriage remains fixed in its position. This long recoil feature is a device of the French, of about the end of the last

century, and is now employed in all modern field artillery. Its use increased the rate of firing for the 75 mm. gun from about one round per minute to more than twenty rounds. The peculiar feature of the French carriage is the recuperator, which returns the gun to the firing position after recoil. The returning force is a spring of compressed air, which is further compressed on recoil, and by its expansion forces the gun back to position. The advantage of compressed air springs as compared with steel springs is that they do not wear out nor break in use. The difficulty about them is the leakage of the air. The recoil of the gun is checked, in both models, by the forcing of liquid, usually oil, through a small orifice. In the French model, a piston drawn through a steel cylinder under the gun by the recoil forces the oil with which the cylinder is filled through a small opening into another cylinder alongside, in which is the compressed air, further compressing the air; and the difficulty in regard to leakage is not only the prevention of the escape of compressed air from the cylinder, but preventing the mixture of the air with the oil in a kind of froth, which would alter the weight of the oil and diminish the pressure required to force it through the orifice, and hence would promote an over-recoil, with resultant damage to the mechanism. The mixture of the compressed air with the oil is prevented by a movable diaphragm called the floating piston, separating them in the air cylinder, and sliding back and forth on recoil and counter recoil. The preservation of the tightness and at the same

time of the freedom of motion in this piston, so that the air will not leak past it, is the peculiar feature of the French model. It is accomplished by extreme nicety of workmanship.

In all other services than the French, including the American service, a steel recoil spring has been used instead of a compressed air spring. It is subject to the disadvantage that, unless made with great metallurgical skill, the springs lose their elasticity or even break. Early in the war we received reports as to the great mortality of these steel springs in the British service, which induced anxiety and disposition to substitute an air spring. Later information indicated, however, that the mortality was due to the lack of experience of the large number of new artillery officers necessarily brought into the service, who had not understood the necessity for keeping the recoil cylinders filled with oil, and had therefore produced breakages by permitting them to become partially empty. Disaster would equally have occurred under similar conditions with the French model. When its cause was properly understood, therefore, the British experience showed no indication that our steel springs would not do as well under the test of war as they had done under conditions of peace.

But the difficulty of manufacturing the French air recoil spring was not the only reason for dissatisfaction with the French model of carriage. Everybody is familiar with the general appearance of a field gun carriage, in which the member called the trail is attached to the axle under the gun and

rests upon the ground by its rear end. In elevating the gun to obtain greater range, a limit is soon reached by the contact of the descending breech with this trail, so that the angle of elevation cannot pass about twenty degrees, which corresponds to little more than half of the range which the gun is capable of at full elevation.

The only way to realize upon the value of the gun is to dig a hole for the end of the trail, or to raise the wheels of the carriage upon a kind of platform. In the American model of 1916 carriage this shortcoming is met by splitting the trail into two parts, lengthwise, hinged at the axle, and separating the rear ends into a V when the gun is prepared for firing. In this device the breech of the gun is allowed to descend between the two parts of the trail, and the elevation can be increased to some forty degrees, corresponding to about the maximum range which the gun is capable of giving. As an additional advantage, though not so important, in the American model the gun can be fired much more obliquely laterally than with the French model without causing the line of recoil of the gun to pass so much outside the point of support of the trail as to cause the carriage to slue about sideways when the gun is fired. Although we have been speaking of it as the American model, the split trail is also a French invention, of Gen. Deport, and is used in the Italian service, although it came out too recently to be adopted in the French service, where its installation would have involved the replacement of a very large number of carriages

already constructed, and the setting up a new manufacturing equipment. The American model embodies certain other improvements, particularly in the method of controlling recoil. It is a significant fact that in July of 1918 the French Government recommended the substitution in manufacture in the United States of the American model, with a recuperator which the Ordnance Department had had designed for it in France the year before, for the French 75.

No other idea could be conveyed by the words of Senator Wadsworth than that the factories of the country were kept employed for months by the Ordnance Department in an effort to produce something which could not be manufactured rapidly in large numbers; while the fact is that these manufacturers were not so occupied, for the reason that the factories were not ready to manufacture carriages in accordance with the designs of the Ordnance Department, or with any other designs. The time was occupied in the erection and equipment of plants, which had not theretofore existed, for the manufacture of carriages of some model, and in the examination of details and the preparation of shop programs, which are always the slow preliminaries in preparation for the output of large numbers of a new thing. During the course of this preparation objection was made to a certain part of the Ordnance Department gun carriage—not the recuperator—that it would be difficult to turn out by the rapid methods quantity production; whereupon orders were changed so as to call for a considerable ma-

jority of the carriages to be of the French design instead of the American design, and work proceeded along the corresponding lines; the manufacture of a large number of American carriages going along as it had been ordered.

The Senator found encouragement in the course of the Ordnance Department under my more fortunate successor, which he expressed as follows:

"The error of judgment committed in the early summer of 1917 caused many months' delay, but the Ordnance Department, now reorganized from top to bottom, is bending every effort to catch up in the production of 75's with carriages and recuperators made after the French model."

The reorganization referred to seems to be that described on page 15, which was the only one of any moment made in the department, and was changed back to the old form shortly after the Senator's interview.

This statement of facts, even if it were all there is to be said, makes a very different story from that conveyed by the Senator's interview, in which it is made to appear that the Ordnance Department either allowed manufacturing plants which might have been employed to stand idle while it was perfecting a new design, or occupied such plants in work whose product had afterwards to be discarded, when they might from the beginning have been making things of proved value. The Ordnance Department took steps to follow out the course which would give the earliest assurance of suitable

artillery, and the definite ultimate assurance of the best artillery; which is further illustrated by the continuance of the manufacture of the eighteen-pounder field gun which the Bethlehem Steel Company was carrying on for the British Government, notwithstanding the fact that the model was not one which either the British or ourselves thought right up to date. The Ordnance Department continued its manufacture in order to take advantage of a going production, while preparing to make something better. The only change was in the caliber of the gun, which was made 75 mm. in order to agree with the others.

But in view of subsequent experience there is more to be said in regard to this change of manufacturing orders from the American model to the French model. The change had been pressed hard upon the Ordnance Department, which appreciated the difficulty of manufacturing the French recuperator, and the difficulty proved so real that by the end of the year 1918 only a single French recuperator had been completed and accepted in the United States; while at the same date two hundred and fifty-one American 75 mm. carriages, recuperators and all, had been completed and accepted, 206 of which had been completed at the signing of the Armistice, and thirty-four shipped across the sea; although the latter did not get onto the firing line. The difficulties of manufacture of the French recuperator were not surmounted till April of 1919, by the end of which month it was considered that quantity production had been established and that the flow of the

output would continue; but this conclusion was based upon the production of only some sixty satisfactory recuperators. Of the sixty, however, twenty-three had been produced in April and twenty in March, so that there was reasonable justification for the conclusion.

Such a small number of French 75 mm. units having been completed in the United States by the end of the second month of spring, it is evident that the supply of this unit would not have been available for the campaign of 1919, if it had taken place; but since the monthly output of American 75's reached sixty in August of 1918 and continued at forty in September and fifty in October, it is a reasonable inference that there would have been a good supply for the 1919 campaign if we had continued to press the manufacture, while treating the French model somewhat experimentally until after its difficulties had been conquered. A strong probability appears, therefore, that the change of the Ordnance Department's original program of pressing the manufacture of the American model was a mistake.

A deliberate survey of the whole subject indicates that there might have been another mistake. The American three-inch gun carriage of the model of 1902, with which our artillery was armed and of which we had some five hundred when we entered the war, was an excellent carriage. Professional opinion has come from the Field Artillery School of fire to the effect that it had some important points of superiority over the French 75, which had been

established by the daily use of the two side by side; and it has been recommended by the school that the American model and not the French should be made the standard. The American 1902 had been in production for some years, and the manufacturing details had all been worked out; the expansion of output would therefore have been a straightforward task. Under these conditions the earliest supply from the United States would undoubtedly have been had by pushing the 1902 instead of the French 75; while preparations for realizing the advantages of the 1916 could have been made by going ahead, in the meantime, with its manufacturing development. If this course had been followed it is reasonable to suppose that progress with the model of 1916 would have been about as it actually was, while we would have had a much larger number of 1902's than we got of the French 75's. But we were too modest about the Ordnance Department's model of 1902.

American manufacturers are to be congratulated upon having been able to apply the methods of standardization and quantity production to the French recuperator, which had not been so produced in France, and also upon having promptly overcome the anticipated difficulty which had led some of them to object to a part of the American carriage as being difficult to turn out in mass. Their success gave assurance of an abundant ultimate supply of the French model and of an earlier supply of the superior American model. It is indicative of the

rapid advance in war material which was stimulated by the war, that both models are now obsolete, being destined to disappear, together with their motive power, the horse; to be replaced by a mechanically driven carriage and a heavier gun.

# VIII

## SMOKELESS POWDER

The smokeless powder in use by the Army and Navy of the United States at the outbreak of the European War, and for some years before, was of such excellent quality that no experiments of any moment for its improvement were undertaken before the close of hostilities. The powder is known as the Nitro-Cellulose type, and is made by treating ordinary cotton with nitric acid and dissolving the resulting guncotton, or Pyro-Cellulose, in a mixture of alcohol and ether, in which it is soluble. The gelatinous mass thus produced is then formed into grains of suitable size and shape, and the ether and alcohol afterwards expelled by drying, leaving almost pure guncotton, in hard, horny pieces or grains.

When the war broke out in Europe the total powder making capacity in the United States was about 50,000 pounds per day, of which about 1,100 pounds was at the Army plant at Picatinny Arsenal, N. J., and something like three times this capacity at the Naval factory at Indian Head, Md. The European Governments, however, had placed such large orders for powder in the United States that by the time we came into the war the manufacturing ca-

pacity of the country had been increased to about 1,250,000 pounds per day, of which the preponderating majority was with the plants of E. I. du Pont de Nemours & Co., Inc. Notwithstanding this large capacity it was evident to the Ordnance Department that more manufacturing plants would be needed. An expenditure of $500,000 had been authorized by Congress for increasing the capacity of the Army plant, either by additions at the Picatinny Arsenal or by the construction of a new plant; but the amount was too small to be of any significance in the emergency, and it was never used. The Department therefore in the first month of the war, April, 1917, requested the du Pont de Nemours Company to consider the subject of expanding the powder manufacturing capacity of the country, and to commence at once the search for a suitable site for a new plant. Certain expansions of existing plants, which were practicable, were made to meet orders for powder by the department, and by October, 1917, the consideration of the subject had reached the point of embodiment in a proposition by the company, pursuant to which, on the eleventh of that month, I submitted a statement of the situation in a memorandum to the Secretary of War. At the time of submission of this statement a few orders for Army powder had already been placed, and accepted by the manufacturers, and there was a small supply on hand.

In accordance with the military program there was called for in addition, as a manufacturing program, the production of 500,000,000 pounds of

smokeless powder in the calendar year 1918 for the forces of the United States Army; but although a certain increase had been provided for since we entered the war, the full capacity of the country, if operated every day in the year, would turn out only 480,000,000 pounds; not enough for the Army alone, without considering either the Navy or the Allies. The allocation of capacity between the Army, the Navy and the Allies was made by the War Industries Board, and this had been done in such a manner as to leave available for the Army only 168,000,000 pounds of the unobligated capacity, to meet the requirement of 500,000,000 pounds, a shortage for 1918 of 332,000,000 pounds.

For the year 1919 it was estimated that the Army requirements would be 600,000,000 pounds of powder, which was 120,000,000 pounds in excess of the country's capacity, even if this were all to be available for the Army's use, which it was not, by a great deal. So that by the end of 1919 there would have been a shortage of 332,000,000 pounds plus 120,000,000 pounds, or 452,000,000 pounds, without considering the Navy and the Allies for 1919. (For a larger force than was then contemplated the estimate for 1919 afterwards went up to 1,000,000,000 pounds.) All this related for the United States to cannon powder alone, without reference to the powder needed for small arms.

At this time the appeals and statements of position of the Allies with reference to the supply by the United States of powder and other explosives for their uses had become most impressive. Their

situation arose from their necessity for importing the bulk of the raw materials for the manufacture of powder and explosives, and from the great weight of these materials as compared with that of the finished product. For the manufacture of one ton of high explosive from eight to twelve tons of raw material are required, depending upon whether coal is included; and for one ton of smokeless powder there are used from fifteen to twenty tons of raw materials. France, for one, although having plenty of manufacturing capacity, was not able to produce herself more than one-third of her requirements in raw materials, and the rest had to come from abroad. The highly important nitrate of soda came from Chile by a long and dangerous voyage on which the submarine was a dreadful menace, which not only took its toll of the nitrate ships but by its alarming destruction of other shipping reduced the tonnage available for nitrate importation. The measure of the rate of prosecution of the war was pretty nearly the amount of ocean transport which was available for all imperative purposes, and at that time the question as to whether this amount could be kept at a figure sufficient to sustain the armies in the theater of war and the civil populations, in spite of the submarine campaign, had not yet been answered.

A body entitled the Technical Franco-American Commission on Explosives had been organized in France and had held several meetings in the month of August, 1917. It had made an extended report of its proceedings and conclusions in which it set

forth the condition of France, stating that "the Government of the United States should be invited to take into its own hands the supplying of the entire amount of powder and explosives necessary not only for the American contingents in France, but as well (and in the proportion of about two-thirds), the powder and explosives necessary for the consumption of the French Armies." It urged that the "decision must not be delayed, in consequence of the critical situation of the stocks and reserves of nitrate of soda"; and added that "This indispensable component in the manufacture of powder and in the greater number of explosives will soon be wanting, and it must be foreseen that by the beginning of the month of December next the production of powder and explosives in France will be reduced to one-tenth of the present amount"; also that it will "follow that by December 31st the stock will be completely exhausted, and consequently the solution heretofore set forth (of American manufacture), becomes imperative, and it must not be delayed under any pretext under pain of incurring disaster." Gen. Pershing transmitted these conclusions to the War Department in a cablegram dated August 23, 1917, and added: To avoid calamity the United States must not only furnish powder and explosives for all of its own forces but must supply about half of the French requirements. It is therefore recommended: (a) That the United States Government furnish all powders and explosives needed for present contracts with the French Government. (b) That the United States Government prepare to fur-

nish by December 300 tons per day of explosives and 200 tons per day of powder for French consumption.

Such was the situation which, in the autumn of 1917, presented itself to me as Chief of Ordnance, responsible for the supply to our own forces and to a large extent to the forces of our Allies, of powder, perhaps the best single measure of strength which is afforded by all the materials of war. It is profitless to discuss the relative importance of indispensables; but the amount of our contribution to victory would be more nearly proportional to the quantity of powder which we furnished and caused to be fired at the enemy than to any other one item of military power. We were not sending troops to Europe to beat the Germans with their fists, nor, in any great degree, to stick them with bayonets or slash them with sabers, but to pound them with missiles sent from rifles, machine guns and artillery by powder, powder, powder. Even the toxic gases, which in the latter part of the war caused thirty per cent of the casualties, were usually delivered among the enemy in shells propelled by powder, which was everywhere demanded and in widespread necessity was next to food itself. The requirements and the threat of shortage had been made strikingly apparent, and the subject was not to be trifled with.

The du Pont Company had such incomparably greater experience than any other agency in America in the construction and operation of plants for the manufacture of smokeless powder, and was so well provided with plans of construction and ad-

ministrative and technical staff, in a going organization, that I had no hesitation in recommending that the company be empowered to erect and operate a plant for the Government, in accordance with the proposition which it submitted. The output for which the plant was to be constructed was 1,000,000 pounds per day, which would have failed by a considerable amount to meet the requirements up to the end of the year 1919; but the enterprise was considered as great as it was prudent to undertake at that time. Subsequent enlargement should have come after it was well in hand. The total estimated cost of the plant was $90,000,000, which was to be borne entirely by the Government, the Company acting as agent both for construction and operation, with a percentage compensation for construction, and a fixed sum per pound plus a premium for economy as compensation for manufacture. The plant was to be in ten units, or lines, with a capacity of 100,000 pounds each, per day, and the first unit was expected to be in operation after about eight months, the whole plant after about eighteen months.

The War Department did not approve my recommendation, and held up the proposition on the ground of excessive compensation to the Company. It is of interest, therefore, to examine in some detail the nature of the compensation contemplated and the estimated cost to the Government of the project, including that of the powder which it was expected to procure.

As stated above, the estimated cost of construc-

tion of the plant—which was expected to be on two sites—was $90,000,000, which included fifteen per cent of the actual expenditures to be paid to the Company to cover its services in connection with the following:

Preparation of plans.
Selection of sites.
Optioning land.
Survey of land.
Making of contour maps.
Supervision of construction.
Supervision of manufacture of machinery and apparatus.
Premiums to employees for extra efforts.
Expense of making purchases.
Expense of following up and expediting deliveries.
Expense of Washington office.
Administrative expense away from the plants.
Depreciation of a machine shop to be purchased at the expense of the Company.
Profits on construction.

The headquarters of the Company were at Wilmington, Del., where the administrative offices and the engineering force were located, and it was intended that the work should be directed from this office, as listed above, leaving to be charged to the work only local supervision and administration at the plants.

For the operation of the plant the Company was to receive five cents per pound of manufactured powder; and if the cost of manufacturing should have been less than forty-four and a half cents per pound of manufactured powder, excluding the five

cents, the Company was to receive in addition one-half the amount by which the cost fell short of forty-four and a half cents. The five cents per pound was intended to cover engineering direction and supervision of operations, other than local supervision at the plant; purchasing and expediting the delivery of materials for operation; premiums to employees; administration of operations other than local administration at the plant, and profit.

Under this proposition the Company would have received a large sum, about $11,758,000, as a percentage of the construction cost, and would also have received a liberal percentage, about eleven per cent, of the estimated base cost of manufacture of powder, for operation; but these figures were to cover, in addition to compensation, very considerable services of the Company to be rendered by the organization, from the headquarter offices at Wilmington. Any saving below the estimated cost of forty-four and a half cents a pound was to have been shared by the Government and the Company. It was estimated that the cost of the plant itself, when spread over a year's output for each of the units, would amount to about thirty cents per pound of powder manufactured, and assuming the cost of manufacturing to be what the Government was at the time paying the Company on orders for powder already given it, forty-nine and a half cents per pound, the output of the plant would have cost seventy-nine and a half cents per pound of powder, including the amortization of the plant in one year. The European Allies had paid $1.00

per pound for the output required to amortize the plant required to meet their needs, and the Company had thereafter charged both them and us forty-nine and a half cents per pound, without any further charge for interest or amortization.

A good deal of interest had been taken in the cost of smokeless powder since its introduction into use in our Artillery Service at the time of the Spanish War. Private manufacturers were at that time and for some years thereafter the only reliance of the Government for the supply of powder, and they were soon consolidated under the du Pont Company. The price almost immediately after that war was $1.00 per pound, and then commenced to somewhat slowly decline. The Government, however, stepped in and accelerated this process by imposing statutory limitations upon the price to be paid, which, before the outbreak of the European War, had come down to fifty-three cents per pound. The Navy Department had during the interval established a small factory at Newport, R. I., which was afterward moved to Indian Head, Md., and somewhat enlarged. In the year 1908 the army factory at the Picatinny Arsenal was built, and the knowledge afforded by its operation permitted the exercise of intelligence in the control of the price paid to private manufacturers. The cost of manufacture at the Arsenal had at one time gotten down as low as thirty-eight cents per pound, including all the overheads which a private manufacturer has to charge, except selling costs, costs of financing and profits, which an arsenal is not subject to. Before our entry into the war, however,

material and labor had so advanced that the cost of the powder at the Arsenal had reached about fifty cents per pound.

Under the circumstances I considered the proposition of the du Pont Company to be suitable for acceptance. The estimated cost, including amortization, was to be about twenty per cent less than had already been paid by the Allies, and the reasonable disposition of the Company was evidenced by the price at which they were currently selling us powder, which was less than our own cost of manufacture and less than had ever before been charged—being three and a half cents per pound less than the statutory price which had been paid before the war; a rise of ten cents per pound of powder in the cost of raw materials notwithstanding. Although the sums to go to the Company in percentages and compensation were large, I had no means of knowing what proportion of these sums would be profit, and in the compelling emergency in which the country stood I felt both justified and bound to meet it by the only agency which could enable us to do so, at a cost which not only did not itself appear to be unreasonable, but compared favorably with every other cost of which I had knowledge.

When my recommendation was not approved by the War Department I invited a conference with the officers of the du Pont Company in an effort to secure a modification of the terms of their proposition, and several weeks were spent in negotiations, and in consultations with the Secretary of War and the War Industries Board, trying to reach a con-

clusion under which the much-needed work could proceed. The Company consented to certain modifications; but, as no ground of agreement as to conditions which the War Department would accept had been arrived at after a month of discussion, I, on November 23, 1917, submitted a new memorandum to the Secretary of War, in which I recommended that the modified terms which I had arrived at with the Company be accepted for the erection of a factory of 400,000 pounds per day capacity, and for its operation for some eighteen months—unless the need for the powder should in the meantime have ceased to exist. I renewed my expression of view that plants with 1,000,000 pounds per day capacity should be commenced at once; but urged the smaller plant, as one which would cover such construction as could be had upon a single site, and of which the commencement would afford a short time for a further survey of the situation, and a search for some other agency to construct an additional plant.

The principal changes in the terms were the division of the fifteen per cent which was to have been paid for overhead services and compensation for construction into two parts, of eight per cent for overhead services and six and a half per cent for compensation for construction; but the compensation for construction was to be paid back to the Government in accordance with a sliding scale, as compensation was paid for operation, at such a rate that the whole six and a half per cent should have been paid back and the compensation reduced to that for operation only, upon the completion of

about 180,000,000 pounds of powder; which was expected to be after about eighteen months of operation. The sum to be paid as compensation for operation was changed from five cents a pound for overhead services and profit to three and a half cents a pound; and to offset this reduction in compensation the base cost below which a premium of the half saving was allowed for economy was changed from forty-four and a half cents a pound to forty-six cents a pound, and the Company safeguarded itself in the matter of the minimum by stipulating that the base cost should go up or down with the price of sodium nitrate. In my memorandum I said: "It must be remembered that all other powder-making agencies than the du Pont Company, including the Ordnance Department, are already strained to the limit, either in powder manufacture or in other duties connected with the preparation of our forces, and that the personnel of the Ordnance Department, in particular, is no more than sufficient to set in motion and overlook, in the interest of the Government, the performance of agencies outside itself; also that there is no such margin of resource for the prosecution of the war as would justify failure to use one of the first importance, in the hope, and taking the risk, of finding a possible substitute."

This recommendation also was not approved by the Secretary of War.

As the lapse of time was making the subject more and more pressing, I made a visit in the early part of December to Wilmington for a conference with the officers of the du Pont Company, with the hope of

further modification of their terms. At this interview I assured them that I considered their assistance imperative for meeting the necessities of the Government, and informed them of my understanding and belief that the question of compensation was the only one standing in the way of their employment. The Company then agreed that they would construct and operate the plants of 1,000,000 pounds per day capacity, as previously proposed, and that questions of compensation for the services of the Company, both in construction and operation, should be referred to a Board of Arbitration of three members to be selected; and it afterward presented this agreement in a memorandum to the Secretary of War, dated December 10, 1917, at an interview for which I made appointment for them with the Secretary. In the meantime a proposition had been made to the Company, drawn up by the War Industries Board under whose advice the Secretary of War had been acting when he rejected my own, and the Company had declined to accept this proposition. Referring to this incident, the Secretary of War declined the proposition including arbitration as to compensation of the du Pont Company, and embodied his declination in a memorandum dated December 12, 1917, stating that the department had proceeded to work out a plan for the direct creation of this capacity by the Government itself.

The War Industries Board, however, took a different view of this last offer of the Company, and, by resolution dated December 13, 1917, stated that the offer fully covered all objections that they had

raised; that the emergency had become accentuated during the delay to an extent that made it vitally important not to lose a single day in pushing the powder project, and urged upon the Secretary of War the vital importance of avoiding any further delay, or of assuming the risk incident to the Government undertaking, either the construction or operation of the plant. The Board thus joined in the effort to make use of the du Pont Company.

But, pursuing the idea of the construction and operation of a plant by the Government itself, the Secretary of War, on December 15, 1917, appointed Mr. D. C. Jackling, without compensation, to build and operate the new Government plants, giving him an entirely free hand and full authority. Mr. Jackling had had no experience in the manufacture of powder, but had been prominently connected with large and successful mining enterprises in a controlling capacity. He decided to commence construction at Nitro, the site which had been selected near Charleston, W. Va., and ground was broken on February 1, 1918. The plant was intended to have a capacity of 625,000 pounds per day, and was about eighty-three per cent complete at the time of the Armistice, when 4,533,000 pounds of powder had been manufactured by the parts which had been gotten into operation.

In the meantime Mr. Jackling had himself concluded that the services of the du Pont Company as an organization, in addition to the help which he had received from it in the matter of plans and prelim-

inary work (the blue prints of the plans covered some thirty-five acres of surface), were necessary for the Government, and on January 29, 1918, a contract was concluded with the Company for the construction and erection of a plant of five units, each of 100,000 pounds per day estimated capacity, at the site which had been selected near Nashville, Tenn., and called Old Hickory. A railroad spur about nine miles in length had to be built to the site of the plant before construction could commence, but ground was broken on March 8th, and the first unit was in operation the 1st of July, some months ahead of the date called for in the contract. In the meantime the project was enlarged, and it was decided to make the Old Hickory plant one of nine units instead of five units. The plant was about ninety-three per cent complete when the Armistice was signed and at that time had manufactured 25,620,000 pounds of powder. It covered about eight square miles of ground, and included a town of some twenty thousand people. It thus appears that although ground was broken for the Nashville plant over one month later than for the Nitro plant, and the plant was to be of fifty per cent greater capacity, it was ten per cent nearer completion at the time of the Armistice, and had then turned out more than five times as much powder as the other plant. So much for the experienced organization, which some of us responsible had not been willing to contemplate the failure to make use of, in the compelling emergency.

As the refusal of the Secretary of War to permit the employment of the du Pont Company had per-

sisted, after the offer of the Company to go ahead with the work and leave the matter of compensation to subsequent adjustment by arbitration was made, a question is raised as to whether compensation was the controlling consideration in his decision. However it was the only one which was objected to during the negotiations; and therefore, although I have not the figures with which to make an analysis of the expense of the rejected projects as compared with that which was incurred under the method which was actually carried out, it is worth while to consider certain broad statements that can be made from which may be deduced the relative financial advantage of the course covered by my recommendations, and that which was finally pursued.

Experience with the construction and operation of the plants which were built, and especially the one which was built by the du Pont Company at Old Hickory, indicates that the plant originally proposed could have been constructed for about the sum estimated, viz.: $90,000,000, and would have produced by the date of the Armistice about 110,000,000 pounds of powder. The cost of manufacture was found to be about forty cents a pound, to which, under the original proposition, would have been added five cents a pound as compensation to the manufacturers and two and a quarter cents a pound as premium for reducing the cost of manufacturing below forty-four and a half cents. The total cost of manufacture, therefore, to the Government, would have been forty-seven and a quarter cents a pound, two and a quarter cents less than it had been paying to the

manufacturers for powder made in their own plants. If to the cost of manufacturing is added the amount necessary to amortize the $90,000,000 plant by the 110,000,000 pounds of powder which could have been manufactured by the date of the Armistice, the cost of the powder becomes $1.29 a pound. That is, if the first course recommended had been followed the United States would, at the time of the Armistice, have had from its plant 110,000,000 pounds of powder which would have cost it, in total, $1.29 a pound.

At the Nitro and Old Hickory plants there had been expended for construction and for powder manufactured, at the time of the Armistice, $153,770,400, and there had been manufactured 30,153,000 pounds of powder. The total expenditure, per pound of powder, at these two plants had therefore been $5.10, as against $1.29, above, and we had some 30,000,000 pounds of powder instead of 110,000,000 pounds. Put differently, the course first recommended would have furnished us with 110,000,000 pounds of powder, at the cessation of hostilities, for an expenditure of about $142,000,000, while the course actually followed gave us about 30,000,000 pounds for an expenditure of $153,770,000. Of course this comparison is not absolutely fair to the method which was followed for providing powder, since hostilities ceased sooner than was anticipated, and the Government was left with large plants on its hands from which there had been time to get but a small production over which to spread the cost of construction. But there is substantial justice in the comparison, nevertheless, for the reason for the small

output by the Armistice date was the long delay in making the effort to avoid utilizing the du Pont Company, and the attempt first made to get on without its help. The late start had rendered necessary the building of larger plants in order to accelerate the supply, and the investment charge was thus increased. It is true that no shortage of powder arose from the delay in getting a flow of increased production, but this was due to the later date than was anticipated at which any large body of American troops got into action; and also it cannot be stated that there would not have been a shortage for such a campaign as was expected for 1919, if it had taken place. There were some 200,000,000 pounds of powder on hand in the United States, from all sources of supply, at the Armistice; but the conclusion in the spring of 1918 to build for a daily capacity of 1,500,000 pounds, and the serious consideration given in the early summer to an additional project for 600,000 pounds capacity, show that my anxiety to get immediately at work upon a capacity of 1,000,000 pounds in the autumn of 1917 was not unwarranted. In the light of half a year's later knowledge than I had the matter of a larger project than mine had been was considered most urgent.

Mr. Jackling and the agencies employed by him in constructing the plant at Nitro were commendably efficient in getting into partial operation a well built plant in time to turn out 4,533,000 pounds of powder by the date of the Armistice; but the handicap which they suffered as compared with the Company having

experience and previous organization for the work, both of which they lacked, is shown by the results at the two plants. The earlier readiness for operation of the Old Hickory plant and the greater output from it have been already mentioned. The total cost for construction and operation at Old Hickory was $95,221,150, which, distributed over the $25,620,000 pounds of powder produced, gave $3.71 a pound. The expenditure for construction and operation at Nitro was $58,549,250, and the quantity of powder produced was 4,533,000 pounds, making the total cost per pound $12.95.

The Old Hickory plant was built by the du Pont Company for a compensation for construction of one dollar. The contract of January 29, 1918, with this Company had called for the payment of $500,000 for construction plans, and for a sum equal to three per cent of expenditures made, for services, with a limit for services of $1,500,000. But this was for a plant of only 500,000 pounds a day; and when, in March, it was decided to build the plant to have 900,000 pounds capacity it is reasonable to suppose that an extension of the limit of compensation for construction would have been allowed. However, the Company desired a somewhat freer hand in making expenditures, especially for stimulating the personnel, than was comfortably practicable with an arrangement under which its compensation increased with its expenditures of Government money, and so, when a supplementary agreement was made to cover the enlargement of plant, it considered it advantageous to forego compensation for construction altogether,

hoping to make it up by an earlier commencement of compensation for operation.

It will be remembered that the original project, of October, 1917, called for the payment to the Company of fifteen per cent of expenditures for construction, to cover certain overhead expenses of the Company and profit. Both the contract of January, 1918, and the supplementary agreement of the March following, abandoned this method of lumping the overheads and the profit, and required these overhead expenses to be kept account of, and paid. I have not just now access to the accounts, and so do not know how much the particular overheads amounted to, and therefore, I am unable to say how much of the $11,758,000, which constituted fifteen per cent of the estimated expenditures, would have been profit, which was saved to the United States by the final arrangement. In the original project the direct compensation for operation was to be five cents per pound of manufactured powder; but the Company would have taken all the risk of an increase in the price of materials and labor, which would have affected its expected premium of one-half the savings in cost of manufacture below forty-four and a half cents a pound. In the second proposition, of November, 1917, the five cents was changed to three and a half cents, but the base cost of manufacture, below which premium should commence, was fixed at forty-six cents a pound instead of forty-four and a half cents; and also the Company safeguarded the premium, in so far as it would have been affected by the important ingredient of sodium nitrate, by

stipulating that the base cost should change in accordance with any change in price of this substance. In the contracts of January and March the compensation was left at three and a half cents per pound while the base price was brought back to forty-four and a half cents, but the contracts further safeguarded the premium by providing that the base cost should vary in accordance with the price of any of the principal materials, viz.: sodium nitrate, cotton, shavings, alcohol or sulphur. In the period of rapidly rising prices these were important stipulations, greatly increasing the Company's chances of securing a premium. On the whole it is difficult to say, without close analysis of the accounts, what advantage, if any, could be claimed for the Government through the change from the terms of the first proposition which was rejected, in October, to those of the first contract which was made, in January, when it was decided to use the du Pont Company after all; but it must have been insignificant in comparison with the financial disadvantage, not to speak of the risk, which resulted from the delay.

The figures upon which the above statement as to accomplishment are based are not exact, but they are as accurate as could be arrived at as late as two months after hostilities had ceased. That is, two months after the transactions to which they relate had ended. Any inaccuracies must therefore be of little moment in comparison with the general facts stated.

I have never been able to understand the reluctance of the War Department to make use of the

du Pont Company. It is true that the payments which were to be made to it, over and above the direct costs, under my first recommendation, were large, and there would be a natural indisposition to pay large profits to a notoriously rich corporation for a war service; but the payments would not have been all profit; they covered various overhead expenses and certain very real risks, and they were for an immense service, of which the desperate need had been urged upon us, and which no one else could render. That the profit was not considered of the first importance by the Company is indicated by its offer of December to do the work and leave the subject of compensation to arbitration, and by its final voluntary agreement to forego compensation for construction altogether, after having already made a contract which included it. The way in which the Company risked its profit is further shown by the actual outcome of the transaction. Owing to the early termination of the war only 31,000,000 pounds of powder were manufactured at the Old Hickory plant at the cessation of operations, some time after the Armistice. The cost of manufacture added to the cost of construction of the plant amounted to something over one hundred million dollars; and the compensation for manufacture, which was all the profit the Company got out of the whole matter, was only about one and three-quarters per cent of the sum which it handled for the Government. Presumably its war taxes had to be paid on this profit.

When I first presented the October proposition to

the Secretary of War, on the 11th of that month, he approved it verbally, but afterwards withdrew his approval by a telegram directly to the Company, in which he gave instructions to stay all action until he could acquaint himself thoroughly with all the features of the matter. Then followed two months of discussion, in which I tried to secure from the du Pont Company concessions which would be satisfactory to the Secretary and the War Industries Board, and tried to convince both that neither the Ordnance Department nor any other agency of the Government could be relied upon to build a powder plant of the magnitude required in any such time as this Company could do it. I knew that the Ordnance Department could build a small plant and could make good powder in it, cheaply, for we had done this; and I believed we could build a large plant if given time to study it out and to proceed deliberately; but for building an immense plant, under pressure of the greatest haste, our much-strained organization could not compare in efficiency with the highly specialized company which had just done that very thing. After one month of discussion I considered it necessary, in justice to myself, to again call attention formally to the urgency of the subject and the danger of further delay, which I did in the memorandum of November 23rd, mentioned on page 255. I had no success with the Secretary of War, but I had some measure thereof with the War Industries Board, which joined me, after the Company's offer of December 10th to arbitrate its compensation, in urging upon the Secretary of War the

employment of the du Pont Company. A week after my final unsuccessful effort to get a powder plant started through this Company I was relieved from the charge of the Ordnance Department.

Notwithstanding the importance of smokeless powder the War Department was subjected to less savage public and congressional criticism with reference to the slowness of its supply than in regard to any other prime matter of armament. Artillery, machine guns and rifles were abundantly noticed, and many harsh things were said of those who were closest to the responsibility for their production; but powder did not receive much attention. It did not escape altogether, however, for Senator Hitchcock, of the Committee on Military Affairs, said on February 4, 1918, in the course of a speech in the Senate in which he was advocating the creation of a director of munitions and a war cabinet, and with reference to the committee's investigation of the War Department: "We found that we are only now, nine months after entering the war, just beginning to work on two great powder plants, costing $90,000,000, the powder from which will not be available until next August. We found that we need a million pounds of powder a day more than America is producing. We found that the need of this powder was known last spring, and that now for the first time we are beginning to build the factories in which the powder is to be made."

"All's well that ends well"; and neither we nor the Allies suffered for lack of powder before the end of hostilities.

## IX

### RESPONSIBILITY

Besides the specific criticisms which have been dealt with at some length in the preceding chapters there were others made in the first winter of the war which were of more general character, and were so all-inclusive in their condemnation of the governmental organizations with which the United States was endeavoring to prosecute the war as to justify a doubt, if they were accepted, as to whether a republic like ours is fitted to carry on hostilities requiring preparation on the scale to which we were committed in the World War. It is probably true that an autocracy is the best form of government with which to wage war. The full power of such an organization as a community of people can best be used against an enemy, or indeed for any purpose for which it must bring to bear its entire strength, acting as a whole, when it is subject to the control of a single will, which can direct all the energies toward a specific object, in accordance with a consistent policy of preparation and execution. Essayists have told us that in the earlier days of man the despotic rule of a chief was the usual form of tribal government, for the very good reason that it was the only form which could survive, in a social

state in which every tribe was at war with all its neighbors, and must have its collective power wielded most efficiently, or must have gone out of existence before a community handled under a better system. This might augur badly for the ultimate survival of democracy in a world of struggle, but as time goes on democracy seems to attract more people of the intelligent races to its methods than does autocracy, and can thus offset military efficiency with superior numbers. This is what appeared in the World War, in which the combined population of the Entente Allies greatly exceeded that of the Central European powers; and even without autocratic Russia had the preponderance of numbers. After America had come in and Russia had gone out, the numerical advantage still continued very great. When the United States was drawn into the struggle autocratic war powers were conferred upon the President, for the duration of the emergency, and our Government was thus brought more nearly to a state of equality in efficiency with that of Germany; but the handicap of neglect in preparation, so characteristic of governments of the people, was still upon us.

I have endeavored to show some of the ways in which our source of power, the people, acting through their very obedient servants both in the Executive Government and in Congress, failed to pursue any adequate policy of military preparation, and even blocked and hampered the military department by statutory hindrances of whose effect they were careless in their concern over the suppression

of various abuses elsewhere. But this location of responsibility was not accepted by all who might be considered to be involved in accountability, and a vigorous effort was made to shift it to other shoulders. The most notable charge, in this effort, against the executive departments concerned with the prosecution of the war, was made by Senator Chamberlain, Chairman of the Military Committee, whose office ought to have insured his being well informed and who spoke from a position of great authority, in a speech before the National Security League, at New York, on January 19, 1918, in which he said:

"The military establishments of America have fallen down. There is no use to be optimistic about a thing that does not exist. It has almost stopped functioning, my friends. Why? Because of inefficiency in every bureau and in every department of the Government of the United States."

This speech was made after a large part of the testimony had been taken by Senator Chamberlain's committee in its investigation of the War Department, and must therefore represent the Senator's conclusion from the testimony. Whether the conclusion was justified by the evidence could be definitely determined only after a complete study of the 2,500 pages which have been printed, but something of an opinion might be gained from the quotations which are given in this text in regard to the most important items of armament. The conclusion was characterized by the President as an astonishing and absolutely unjustifiable distortion of the

truth. The New York speech was followed by one delivered by Mr. Chamberlain in the Senate on January 24, 1918, in which he defended himself against the reproof of the President, and made his most serious and extended charges against the War Department. I have made several quotations from the references in this speech to the Ordnance Department, in the chapters which deal with certain special subjects of criticism, and these I think, are sufficient to show its purport. It was carefully analyzed in the light of the published evidence, and answered, by the Hon. Carter Glass of the House of Representatives, on February 7, 1918. Mr. Glass had no previous relations with the Ordnance Department, was not a member of any committee having to do with legislation for that department, and was personally unacquainted with the Chief of Ordnance. His appreciation of the evidence, therefore, was such as might have been had by anybody who would take the trouble to inform himself in regard to it. For these reasons I give several quotations from his speech:

"If, with good reason, it may be charged that the people of the United States with their constitutional freedom of speech and of the press, have been so indifferent to their liberties and so insensible of their own security as to commit 'every bureau and department of Government' to incompetent hands, would we not better welcome, rather than resist, the invasion of Teutonic Kultur?"

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"Mr. Chairman, when an earnest quest for the truth carried me painstakingly to the end of nearly

2,000 pages of responsible testimony only to find revealed the utter insufficiency of proof to sustain the astounding censure, distress gave place to amazement."

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"We have been asked to search the record, Mr. Chairman, and it is to the record that I appeal. I have seen it with mine own eyes and with mine own ears have heard it expounded. From the testimony I have turned away, not with tears nor with trembling apprehension for the well-being of my own sons or the sons of other fathers, but with a firmer faith in my country, praising God for the quiet courage of the men and the ineffable fortitude of the women of America who are to win this war. And for those who impeach their fidelity and deride their capabilities and seek to decry or obscure their achievements we should invoke the imprecations of every loyal citizen."

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"What member of Congress does not very definitely know that France is furnishing the American Army with guns, not because we sought to deplete her 'meager stores' but because her chosen ambassadors and picked experts asked the privilege of arming our expeditionary force from her oversupplied arsenals. It was the wise thing for France to have proposed and the only effective thing for America to have done."

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"It is because of gross ignorance of the truth that critics bemoan a condition which, in the circumstances, any discerning man must see is of tremendous advantage to France as well as to America?"

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"From it all we may deduce the comforting assur-

ance that the War Department is more concerned to furnish the American Army in France with modern guns with which to train and fight than it is to haggle with ambitious statesmen over the source of supply."

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Under the heading "Machine-gun Squabble" Mr. Glass made the following statements:

"Mr. Chairman, in support of the intemperate charge that the 'Military Establishment of the United States Government is a myth—that it has no existence—a charge contemptuously echoed only the other day by a German military expert in a German newspaper, the controversy over the Lewis machine gun and the Browning gun is revived, and in the very obvious attempt to discredit the Government and to 'get Baker' the critics try desperately to convict the Ordnance Department of incapacity and the Chief of Ordnance of personal venom. I addressed myself to an examination of the evidence deeply prejudiced against Gen. Crozier; but there is not one particle of disinterested testimony in the hearings which does not abundantly acquit the Chief of Ordnance of blame."

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"The whole point of what I am saying goes to establishing the fact that the Ordnance Bureau of the Government cannot be discredited, even in this single detail, when we balance the testimony of experts against the self-interest of disappointed persons and the miserable bias of fretful politicians with a case to make out."

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"It is absolutely convincing that delay, if any, occasioned by the retrial of machine guns and the

selection of the Browning is much more than made up by the vastly superior qualities of the gun accepted. Talk to the contrary is mere inference, amateur inference."

It is not astonishing that before his examination of the evidence Mr. Glass should have been prejudiced against me. Considering the interested charges which had been made, and the public endorsement of them by certain prominent Senators, it would have been astonishing if he had not been prejudiced. Addressing himself to the outcry over the changes made in the Enfield rifle before manufacturing it for the forces of the United States, he made the following comments:

"And they bring up the old rifle dispute, Mr. Chairman, and hang a complaint on that peg by seeking to have it appear that the Army experts did not know their business. Men like Scott, Chief of Staff at the time; Bliss, next in rank; Crozier, Chief of Ordnance; Kuhn, of the War College; Pershing on his way to France, were unsafe advisers to the Secretary of War!"

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"It seems to be the idea of some distinguished gentlemen that we should have grabbed up any old instruments of warfare and sent a ragamuffin army across the Atlantic instantly to break the Hindenburg line. They did not want us to have modern rifles, nor did they want us to have the best machine gun in the world. Their impatience ran away with their discretion."

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"Frustrated in the obvious desire to prove the inadvisability of the change from the technical

viewpoint, and 'hell bent' on making out a case of disastrous delay, one of the hostile critics of the War Department asked Mr. Vauclain how many rifles would have been produced had there been no change of model, to which the witness made the heartbreaking response, 'Not one more than we have to-day.' And again and again this great captain of industry, this 'driving power' of the Government's artillery and munitions force, vindicated the efficiency of the Ordnance Bureau and confounded his inquisitors."

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"What the American people will desire to know, and what these hostile critics of the Government have been unwilling to tell them, but what the testimony itself abundantly reveals, is that no appreciable time, after our declaration of war, was lost in turning out rifles for the American Army."

Addressing himself to the question of responsibility for the lack of munitions of war with which this great, rich country entered the most formidable conflict of all time, Mr. Glass gave his conclusions from the evidence recently adduced, and from his knowledge as a public man of the national course throughout the preceding decades:

"But Mr. Chairman, I earnestly invite the attention of the House to this point: Backed by an incontrovertible record of events, I assert that if there was a shortage of modern rifles, or even of dangerously defective weapons, the responsibility is not with the Bureau of Ordnance."

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"Why did not the Ordnance Bureau function? Let the Chief of Ordnance tell the story of how the

Ordnance Department of the Government did function to the fullest extent of lawful permissibility. I shall put into the record—for it can do no harm—extracts from Gen. Crozier's testimony bearing on the subject. But in contemplating the sweeping indictment of his Government by Mr. Chamberlain the astounding thing to which I invite your attention right now is the fact that, with all his precognition, Mr. Chamberlain did not function. He was and is chairman of the Committee on Military Affairs of the United States Senate, with access to every particle of available information. In a large sense he held the purse-strings upon military expenditures, because the Senate always increases and rarely decreases appropriations. For a long time this Government has owned two arsenals, one at Rock Island and the other at Springfield. Ten years before the war the appropriation for small arms in these establishments aggregated $1,700,000; a year later, $1,778,000; a year later, $1,700,000—at a time when nobody in America could have dreamed of war. And yet in 1915, practically two years after Mr. Chamberlain had assumed the chairmanship of the Senate Military Committee, when for seven months war had raged in Europe, the appropriation for small arms had gone down to the pitiful mark of $250,000, and that, Mr. Chairman, so far as the record discloses, without one word of protest or even admonition from these adversary critics and calamity shriekers. Furthermore, the fires at the Rock Island Arsenal had long been out; how long I do not know. The arsenal at Springfield, where the best rifle in the world is made, was running at one-eighth of its capacity. The war had reached its trench-fighting stage, furnishing a fair inference of a protracted struggle. Kitchener had predicted that it would last three years. Notwith-

standing these things, Mr. Chairman, the men who now affect preknowledge of future events did not increase by one dollar the trifling appropriations for small arms, but reduced it from the preceding year by nearly fifty per cent. The expert foremen and skilled artisans at the Government armories had been scattered and the forces disorganized and demoralized, so that later, when operations were resumed, the Ordnance Bureau had to get these people back by bidding high against private establishments engaged on munitions for foreign governments. Was Crozier to blame for that? Is this soldier to be assailed and his reputation destroyed by the cruel imputation of inefficiency levelled by the Oregon Senator at this New York meeting against every bureau and department of his Government? I protest, Mr. Chairman, it is not just; for Gen. Crozier, we are told, did not know the truth. The President did not know the truth. Secretary of War Garrison did not know the truth. Tardieu and Lloyd-George, great ministers of munitions of foreign governments, Scott and Bliss, Pershing and Kuhn—none of these knew the truth. Only this world-wise Oregon critic knew the truth, and at the critical moment he failed to function! With a moving picture of America at war before his eyes, with strong conviction in his mind, distressed by his very contemplation of our utter inefficiency, he permitted the small-arms appropriation of the American Congress in the very year that the *Lusitania* was sunk to go down to the contemptible figure of $250,000!"

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"Oh, Mr. Chairman, the utter proneness of poor human nature to evade just responsibility and to reprehend in others the ugly things that most afflict our own records and dispositions! Why not be strictly honest with ourselves and brutally frank

with the country! Let us tell the unhappy truth, which is that for a century and a half, we have emphasized the single warning of Washington against 'entangling alliances abroad' and sadly neglected his admonition about a sane preparation against war. We have hated militarism with such a holy hate that now we constrain Heaven and earth to avoid becoming its victim. Our aversion to a large standing army is traditional and constitutional—bred in the blood and bone of successive generations. The whole policy of the Nation for all these years has been antagonistic to preparation. No one group of men is to blame. No one political party above another is to be censured. If anything, some of the most frantic protestants against our plight share tremendously the responsibility for our condition, and conspicuous among these culpable critics are the distinguished gentleman who made that New York speech and the distinguished gentleman who led the applause of the unbridled indictment. But because we were unprepared is no reason to infer that we are not being prepared; and being prepared, Mr. Chairman, at a pace that has amazed the European nations in arms. Gen. Crozier's testimony, and that of other witnesses, shows conclusively that there is no particle of excuse for the charge that the Ordnance Bureau was indifferent to passing events, that it was supine, that it did nothing to anticipate trouble, that it fell down and has ceased to function. The testimony is to the contrary, the facts are the very reverse; and the evidence and ascertained facts together would warrant a characterization of the charge as wanton."

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"Gen. Crozier, as far back as 1906, warned the Congress and the country of our utter lack of preparation, and for years successively repeated the

warning. In January, 1911, he pointed out that we were 'worse off in this matter of field artillery than in anything else,' and warned that 'in case of an emergency of any importance, the field artillery of the United States would be found positively insufficient.' The emergency has come, and not even an appropriation of $16,000,000 immediately before going to war nor of $396,000,000 immediately after going to war can provide all the guns we need as we need them. The Congress cannot evade its responsibility, and to attempt to shift it to the War Department and thus to discredit by a charge of inefficiency every branch and bureau of the Military Establishment is an unspeakable injustice."

These speeches of Mr. Chamberlain and Mr. Glass constitute respectively the most sweeping indictment and the most general defense of the Ordnance Department which appeared in the contemporary utterances of responsible public men. Both speakers were of the same political party as the Administration. Both men were informed as to the evidence; one through his official connection with its elucidation, the other through special study of it for information. I have therefore felt justified in quoting rather fully from their speeches in order to give the most representative views of a subject in which the public was at one time keenly and patriotically interested, but which few have time to examine for themselves.

There were other public men of long experience and intimate knowledge of governmental methods who, without making any special review of the incidents attending our early struggles in the war,

knew from personal observation where the responsibility for our unprepared state definitely rested. Mr. Tilson, of the Military Committee of the House of Representatives, in an address before the Hardware Manufacturers' Organization for War Service at Atlantic City, on May 27, 1918, which was printed in the Congressional Record of January 8, 1918, said upon this point:

"One of the reasons we were caught unprepared was that as a people we were not genuinely interested in things military. You gentlemen understand this. Apply it to yourselves five years ago. How many thought seriously about the military situation or of national defense? We might just as well own up and be honest with one another and with ourselves, especially. Very few men in the country were interested in the military situation at all. If you and all the other men over the country had been alive and awake on this subject, which we were not, you would have seen to it that somebody else was interested. Your interest would have been communicated from one to another until after a while we should have had general interest and all of these things would have been done. We were engaged in something else, however, and were too busy to bother with little things like national defense; hence we failed to be prepared to defend our own national existence."

Mr. Sherley, of the Appropriations Committee of the House of Representatives, as chairman of the sub-committee which deals with appropriations for artillery, had had close experience with the way in which the subject had been handled legislatively through a number of preceding years, and said in a

speech in the House on February 15, 1918, which was printed in the Congressional Record of February 19th:

"What has been the result? When the great war broke there happened just what I prophesied three years ago would happen, namely, a breakdown at the desk of these administrative officers, not because they were inefficient, not because the Government was not efficient in the sense that term is used ordinarily, but because Congress had refused for years to give a sufficient corps capable of expanding quickly and dealing with a great matter such as was thrust upon it. And every man who wants to be honest must admit it. And yet there is always a tendency here to blame the other man for failures and never to look into our own hearts to see how far we are to blame for these things."

In the Senate also, where most of the criticism was made, there was appreciation by well-informed members of the reason for the shortages which brought forth the criticisms. On February 8, 1918, Mr. Thomas, of the Military Committee, said in an extended address printed in the Congressional Record of February 11th:

"I am not surprised, Mr. President, that we are not yet able to produce heavy artillery. I am not surprised that we are not yet ready to produce powder to the capacity which may be demanded in the war. These are patent facts, but who is primarily to blame for it? As far back as 1913, when, as a member of the Committee on Military Affairs, I first attended its sessions, as I have for every year since, we have been warned by the experts of the War Department not only of its inability to produce

these very needed articles of equipment immediately but that it would take a very long time to do so after its orders were placed.

"Gen. Crozier has told us time and again that from the time of the placing of an order for heavy artillery to the time of its completion and delivery would require from twelve to eighteen months. Now we—and I accept my share of the blame, if blame there be—should have heeded that and similar warnings, and should long ago have provided the means and enacted the legislation empowering the War Department to obtain this artillery and to place the orders for it. If we had done so, we should have had it in due season.

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"Red tape is due in large part to our methods of legislation and in large part, perhaps, to the genius of our Government. Our methods of appropriations, Mr. President, are specific; they are not general. A general appropriation bill, an appropriation bill relating to the departments, contains from 175 to 200 pages, and specific appropriations are made for everything, even for the clerks and the employees. In the administration of that sort of a law, with responsibility necessarily fixed for expenditures in the way which it provides, red tape will ensue as naturally as maggots from a decaying carcass."

# X

## CONCLUSION

It would be an ambitious hope that this writing could have much direct effect in stimulating the American people to the kind of active concern in matters of military preparation which they exhibit in regard to other issues, upon which they rest their choice of representatives in the national Legislature. Today's questions press hard; and the necessity for the use of military force is always thought to be remote. Economy is a good cry, and military preparation is expensive. There is temptation therefore to put the legislator to the strain of defending his action in favor of appropriations for this kind of purpose. Above all, an understanding of military matters is difficult, and popular expositions are very little set forth by military men, the natural experts in the subject. Railroad people write and speak abundantly about their business when legislation in regard to it is pending; and participants in industrial activity, both on the side of employer and employee, spread abroad a great deal of information about labor questions. But army officers do not take free part in the kind of public discussion which brings forward and clarifies the issues upon which a free people expresses its

demands. There is a class of people, however, who make it their business to study and present to the attention of the voting public the important questions of policy; the magazine and editorial writers, the college presidents, the men who have rendered prominent service; all these are public instructors who have a necessary function in the formation of opinion, and who are therefore indispensable agents of popular government. These writers and speakers would be particularly handicapped in an attempt to place before the public the labors and difficulties of a technical military supply department, both by unfamiliarity with the professional considerations, different from those of civil life and by the obscurity of the laws and rules under which these departments operate; and I therefore venture to hope that, in gathering together from the body of the laws and from the experience of the Ordnance Department certain illustrative examples both of real difficulties and of unfounded accusations, I may be making it easier for these public teachers to secure the data for lessons which their responsibility of occupation should remind them are due from them. In presenting these examples I realize that I have quoted from original sources of information at length too tedious for popular reading, but I have done this with the view of enabling any one wishing to use this book as a reference to be sure of his ground without having to resort to a deterrent search for evidence. I read, in the early winter of 1917, an editorial in a great daily newspaper which commented on a visit of two

distinguished Senators to some of the Army Cantonments. The Senators had found the inevitable, in that there was a shortage of military supplies of more than one kind, and the editorial expressed the hope that the individuals responsible might be compelled to retire and make way for others more efficient. This typical editorial failed to realize that the people responsible were the citizens of the United States, and that their responsibility related back to the years when they were permitting the accumulation of an impossible task for performance by an always insufficient personnel. The intelligent but uninformed writer represented a large class, upon which the reading public was dependent for its information as to the progress of the country in making ready for war. It is my hope that the facts in this book may render it easier for such writers to make a sound analysis of our national situation in the early wartime.

There is another purpose which I think not inappropriate for attempt by one who can write of events with the intimate knowledge which comes only from participation in them. The purpose concerns the investigation of the War Department by the Senate Committee on Military Affairs, which was commenced upon the opening of the session of Congress in December, 1917. An investigation by this body was entirely appropriate. Although our form of government does not involve direct responsibility of the heads of the executive departments to the legislative branch, there is nevertheless an acknowledged duty of the representatives of the people who

compose this branch to scrutinize the performance of the executive government, in the interest of efficient administration. Whenever any matter of extraordinary interest has transpired in an executive department, and particularly when there has been a charge or a suspicion of mismanagement or wrongdoing, investigation by one of the regularly constituted committees of the Senate or the House of Representatives, or by a specially appointed committee, has followed .as a matter of course. There can be no sound objection to the practice.

But investigation should be made with consideration for the task which is laid upon the executive officials, and should not be conducted in such spirit of hostility to the department under investigation, or to any of its important officials, as to require the latter to neglect supremely important duties in order to defend themselves against attack, unless there is strong presumption that they have failed in the performance of their office. Although the Senate Military Committee displayed no indisposition to accept what the evidence soon brought out, namely, that the backward conditions were the result of long acting causes, a few members so persistently refused to accept the statements of responsible officials, and by their utterances gave such force and notoriety to the biassed complaints of interested parties, as to require busy officers to suspend their work of making ready the Army, and devote time which they did not have to spare to the preparation of replies to attacks. In the month of December, 1917, the two officers of the Ordnance Department

who had most to do with the procurement of machine guns were obliged to shut themselves up and deny interviews to designers and manufacturers, as well as to their own subordinates, for five days, in order that they might gather from the records the data for refuting the misinformation which had found lodgment in certain minds; and my own testimony before the investigating committee, in the same month, occupied over two hundred printed pages, and naturally took much more time for its preparation than for its delivery. This and other like incidents interfered with war preparation, but the officers' time was necessary in order to forestall radical action based upon misapprehension. No critic ever came to my office during the investigation for the purpose of seeing what was wrong at the nerve center of ordnance supply, and whether he could help by the exercise of his own powers; but they formed judgment without the assistance of such easily made examination, and proposed readjustments based upon assumed defects in the Department's organization. The organization was good; and the critics never learned that the inadequacy was due to insufficiency of resource which might have been remedied in the years preceding, but in the emergency was being met by extraordinary expansion, requiring time. Although the committee took no action in disapproval of the Ordnance Department, and made no report of the part of its investigation which related to that Department, the individual members above spoken of claimed to voice the sentiments of the committee in expressing their own

harsh criticisms; and in the absence of a report their claim could not be fully controverted. I have quoted dissenting views expressed by some members of the committee, but I think the Department was entitled to a report.

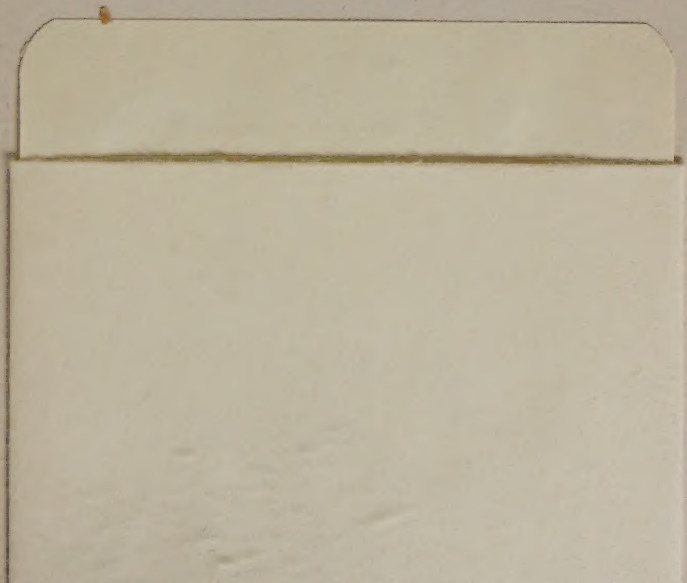
The great achievements of the Ordnance Department have been described in other publications, both of permanent character and appearing in periodical literature, but these have not undertaken to state whether the Department had to be recreated for its purpose, or whether it performed its task with no essential change other than tremendous enlargement; nor have they attempted to reply to the charges of basic errors of the Department when it was going its own way, and that they were only corrected after they were revealed by the efforts of the hostile members of the investigating committee. I have therefore endeavored to recite herein the facts and the evidence which show that the Ordnance Department was adequate for its proper functions, in so far as it could be with insufficient numbers and resources; that its officers labored devotedly and successfully, and with proper methods, in making use of the facilities of our own and our allied countries and the auxiliary agencies created to supplement the regular departments, to supply our armies with fighting material; and that it increased its numbers by personnel of a high type which it secured, assigned to duties appropriate to its aptitudes, and assimilated. I think the record also shows that the investigation of the Senate Military Committee, in so far as it was conducted by its se-

vere critics of the Ordnance Department, consumed uselessly the time of busy officers; slowed up preparation at a time when the work of the Department was most pressing; brought us nothing that was informing or helpful, and stirred up the country on wrong lines. The only effect which it could have on a real effort at reform would be to direct it astray. The professional department had realized the right thing when it saw it to be done; but the newly inspired critics, uninformed through inattention, did not recognize the right even when they saw it already accomplished.

Undoubtedly the Ordnance Department can be improved in its organization in the light of the experience of the World War. It can be given some method of utilizing the services of civilians of scientific attainments, for at least a part of their time, in dealing with the problems which it is always having to handle; and the method can be made such as to cause these gentlemen to take a pride in rendering the service. The relations between the department and the industries of the country which would be utilized by it in time of war can be made closer in time of peace. Machinery can be devised for the coordination of the ordnance and other departments in time of war which is not needed in time of peace, and can be given such artificial practice in peace time as to make it readily available and expansible in war, instead of having to be newly created, as in the late war. But it would be a mistake to conclude from our experience that the functions of the Ordnance Department should be

assigned to a different kind of personnel, in a different kind of organization, such as was proposed, for example, in the early part of the war when it was urged that the procurement of munitions of war should be taken over by an organization of civilians, on the ground that as business men they could handle it better than ordnance officers with training supposed to have been military only. As a matter of fact the department was enlarged by the recruitment, among others, of business men, who did their work within the organization, instead of setting up a new one, and did it with great satisfaction and success. The procurement itself, meaning the placing of contracts and orders for manufacture, was put under the coordinating direction of a very eminent business man, whose selection of the Ordnance Department as the organization in which he volunteered his services to help see the war through was a testimonial to the standing of the department in the business community.

The proper committees of Congress will work assiduously at the preparation of an Army reorganization measure for presentation to their respective houses, and they will have the carefully studied assistance of all the branches of the War Department, as well as the results of observation of officers who served in the theater of war. No doubt the measure will embody the best wisdom which is available. But whatever it may be it will fall short of success unless the idea which is behind it, the military preparation of the country, shall inspire the people to better support than they have ever given in the

past. It is an ungracious part to tell the people that they are wrong. They are not accustomed to hear it. Public men, from whom they hear most about themselves, are given to assuring them that they, ultimately, are always right, and that their collective judgment should invariably be accepted. Their collective judgment must be accepted because they have the power to enforce it; but that it is not always right is evidenced by all the expense and bloodshed which took place in the World War, after the date at which a prepared America might have brought it to an end. It is the duty of the citizen to have an opinion about matters of national defense, and although this does not mean that he should make himself an expert in the subject, it does mean that he should require attention to it upon the part of the men whom he supports with his franchise, and that he should encourage and sustain them in forwarding it, in accordance with views which the citizen should take the trouble to ascertain while the public servant is in the candidate stage. If this book shall make any contribution to public interest in the labors and trials of those who toil to prepare the nation to meet its enemies it will accomplish its purpose.

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